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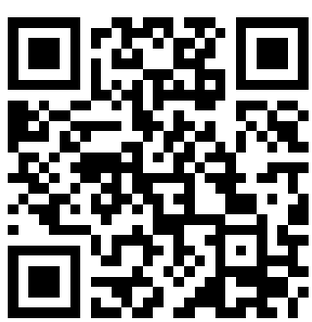

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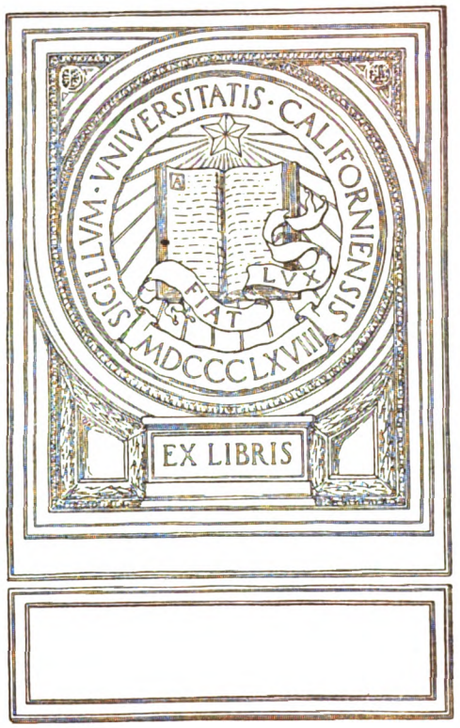

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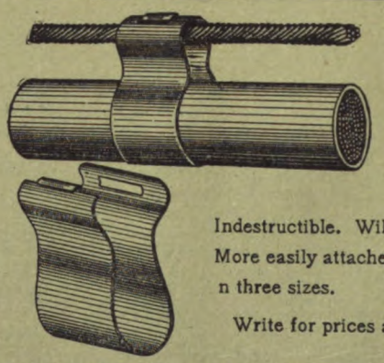

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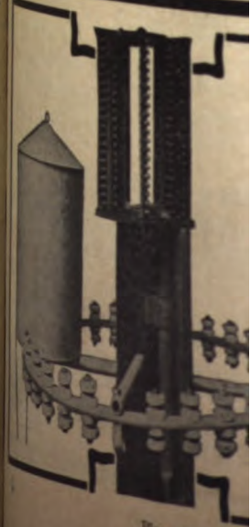

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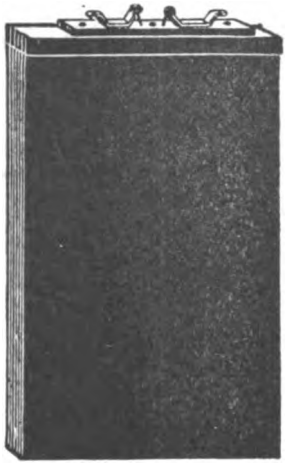

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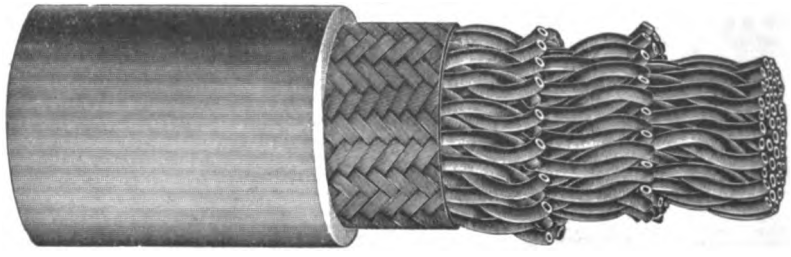

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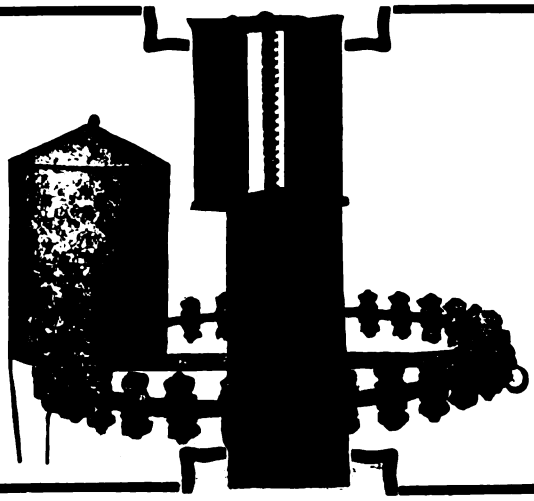

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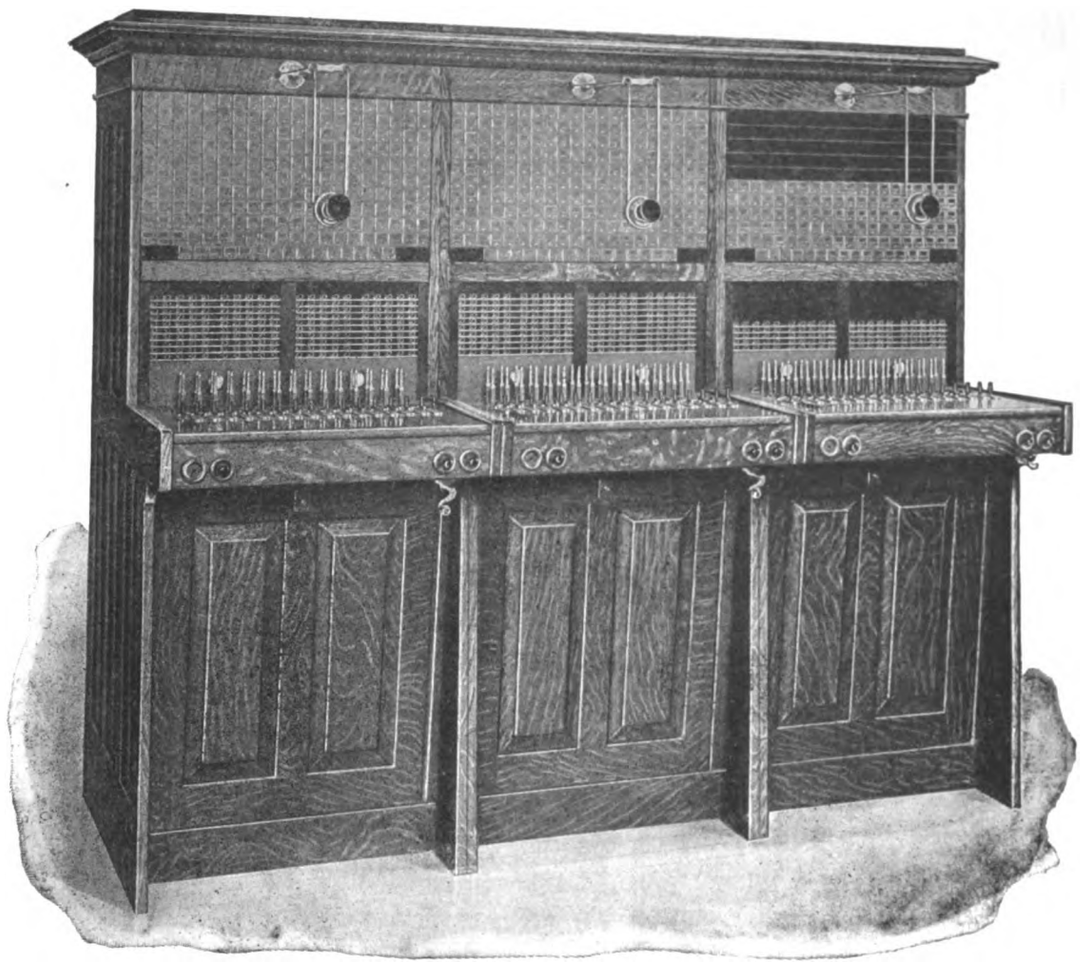

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Another Weston Patent Sustained.

Patent No. 497,482 for shunts for Electric Light and Power Stations Sustained by his honor, Judge Holt, of the United States Circuit Court, Southern District of New York.

Extract from the opinion of the Court in the case of the WESTON ELECTRICAL INSTRUMENT CO. vs. EMPIRE ELECTRICAL INSTRUMENT CO.

"This is a suit to restrain the infringement of a patent, No. 497,482, dated May 16th, 1893, issued to Edward Weston, and now owned by the complainant, for a shunt for electric light and power stations. There are no questions as to jurisdiction, parties or title. **The proof of infringement is conclusive, and is not controverted.** . . . Prior to Weston's patent in 1893 no practical method for the use of a shunt in connection with the measuring instruments for such large currents had been found, although the necessity for such an instrument was thoroughly appreciated, **and many electricians all over the world attempted to invent one.** In actual practice, no shunt at that time was used. The measuring instrument was applied to the entire current, but the result was unsatisfactory. The measuring instruments were complicated, inconvenient and expensive, and the measurements which could be made by them were inaccurate and unsatisfactory.

"The essential problem in discovering a shunt which could be used with a powerful current was not electrical but thermal. . . . The instruments manufactured under Weston's patent **immediately entered into substantially universal use** in all large central electric power and light stations, and have ever since been used almost exclusively as ammeters for large electric currents. . . . All the shunts relied upon by the defendants were shunts which made no use of the methods which Weston used to dissipate the heat in case of a large current. **None of them had struck upon the idea of making the plates of high resistance short, so that the heat in them would be rapidly absorbed by the terminals, and none of them had hit upon the idea of making the terminals massive** so that they would radiate a large amount of heat rapidly from the plates of high resistance. **I think that Weston's patent not only embodies invention, but that it embodies invention of a very high and superior order. It adopted a method of dissipating heat which was not only novel, but was in line entirely opposite to the direction in which all other electricians had been working.** . . La Roche testified that he constructed in or about 1884 an instrument called a voltmeter, and a shunt, and that from 1884 until about 1888 or 1889, he used this shunt in connection with this voltmeter as a measuring instrument, for the purpose particularly of testing storage batteries, at his workshop in Germantown or Philadelphia. . . The evidence establishes, in my opinion, that the instrument called a voltmeter was formed by putting together a number of instruments or parts embodying different inventions, none of which had been made or was known to electricians before Weston applied for his patent; that it would have been a marvelous and almost impossible thing for the most skillful electrical inventor at that time to have devised such an instrument; that La Roche is a man not only without any scientific education, but without even the ordinary electrical knowledge of a skillful electrical mechanic; that his reputation for veracity is bad; **that his shunt never was used as a measuring instrument in connection with his voltmeter between 1884 and 1889; that the various pieces of apparatus constituting the voltmeter were put together by La Roche after the issue of the patent in suit to Weston, with the object of being used in support of his own untruthful testimony** to be given in this and other suits for the purpose of attempting to invalidate this and other patents issued to Weston; **that a part of the apparatus contained in the said voltmeter are two magnets, which are so arranged that their poles neutralize each other; that as a result it is impossible for a current of electricity in passing through the instrument to move the coil; that therefore the instrument is and always has been inoperative, and the shunt could not have been used as a measuring instrument in connection with it.** In short, I cannot avoid the conclusion that the testimony of La Roche in this case was deliberately and intentionally untruthful and that to support it he deliberately fabricated an instrument, to be used upon this trial and other trials involving Weston's patents. **It was a careful, premeditated, and elaborate attempt, by untruthful testimony, fortified by fabricated exhibits, to deprive Weston of his just rights in his inventions, to impose upon this Court, and to pervert the course of justice. I direct that the evidence and exhibits in this case be submitted to the District Attorney in order that he may take under consideration the question whether a prosecution should be brought against La Roche for perjury."**

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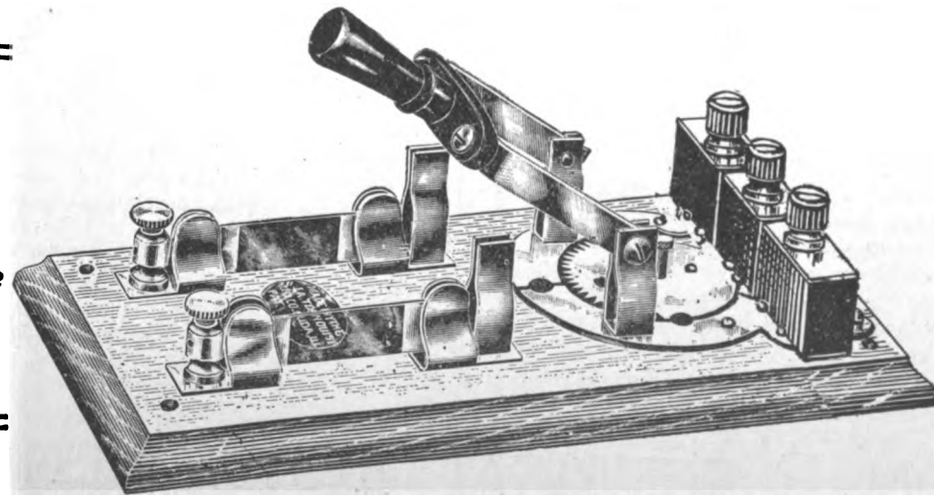

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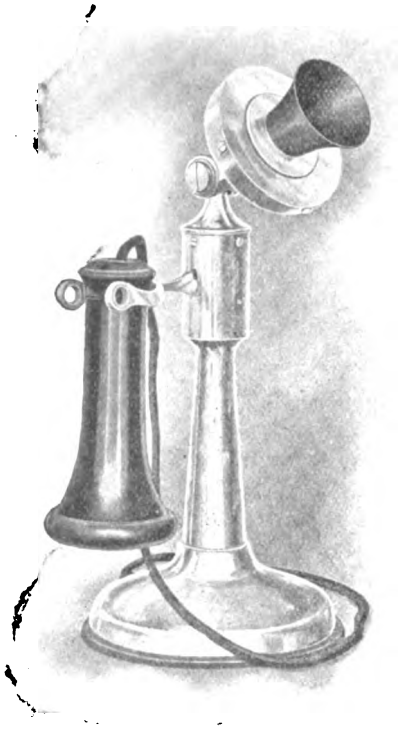

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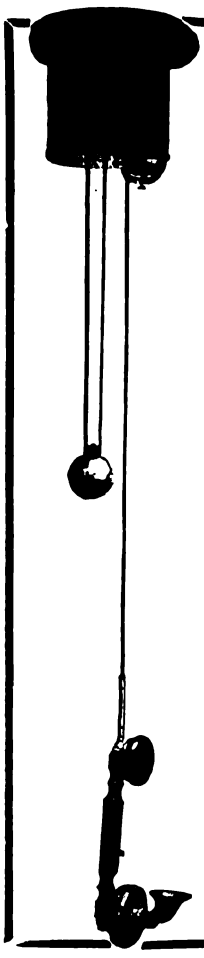

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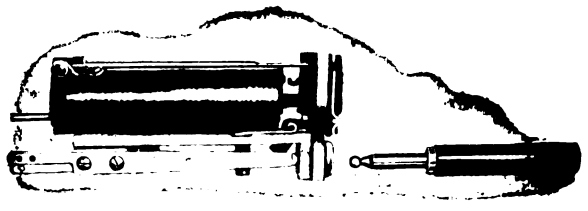

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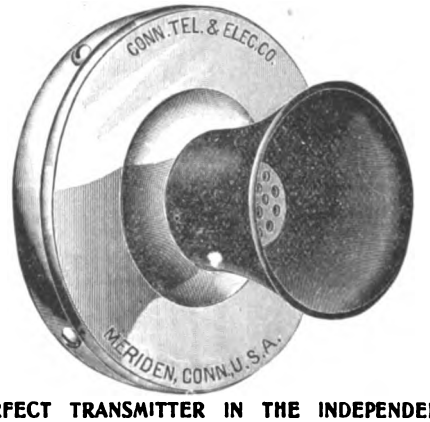

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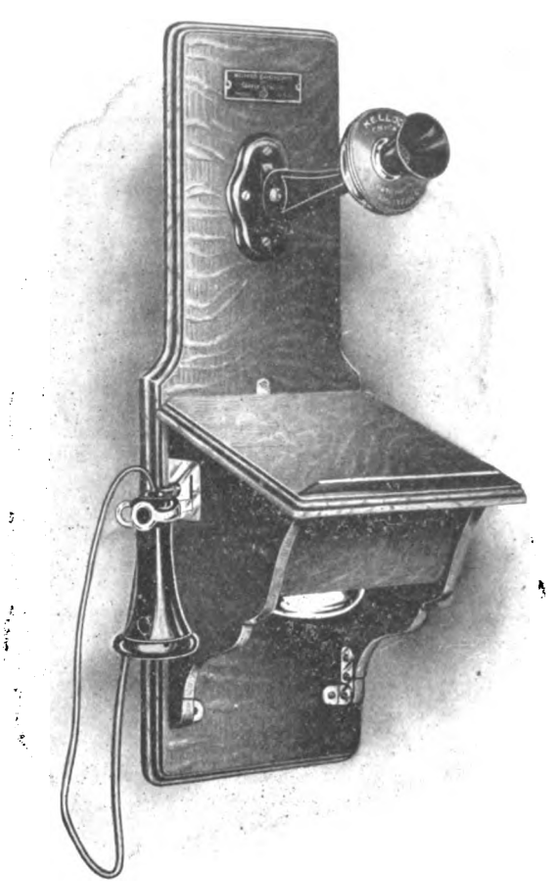

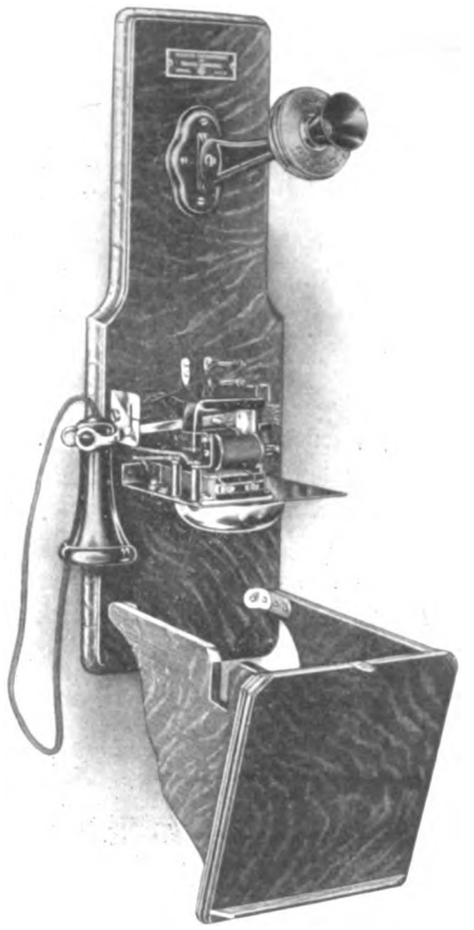

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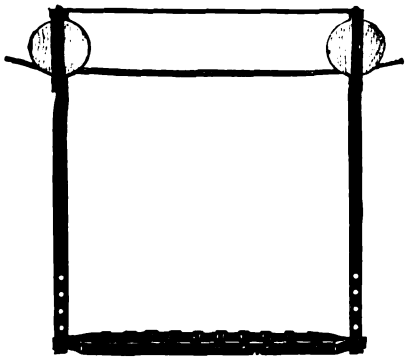

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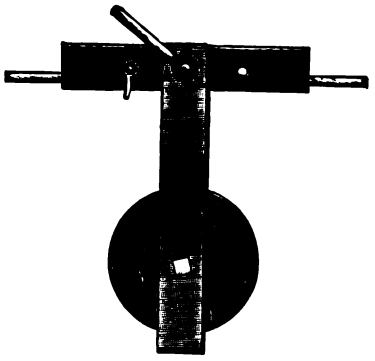

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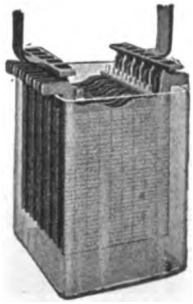

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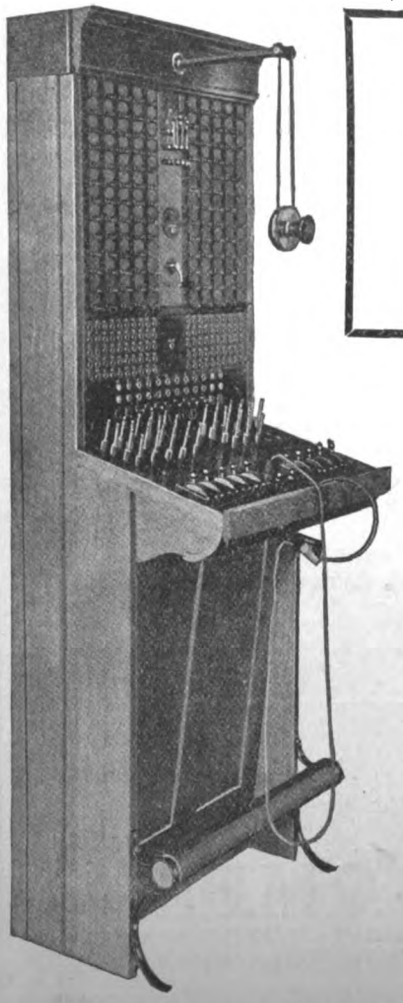

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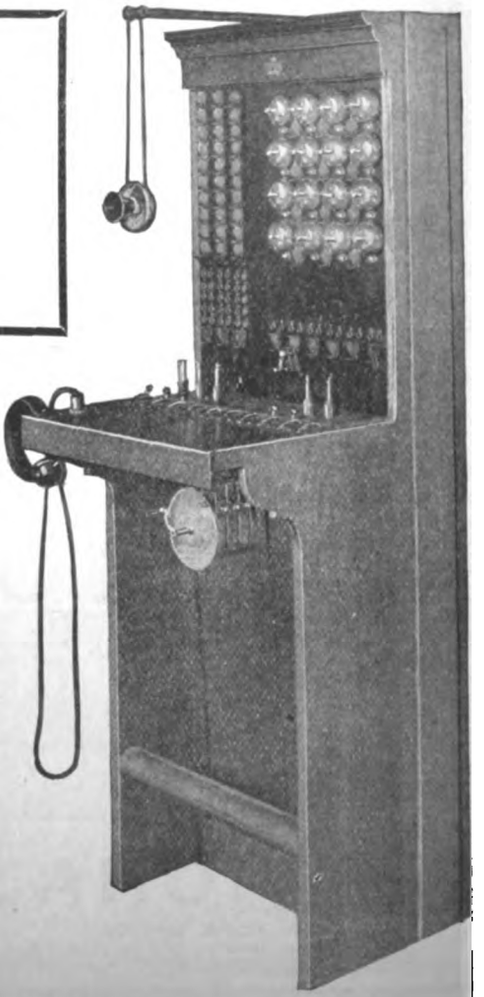

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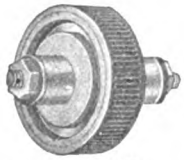
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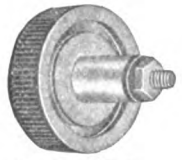
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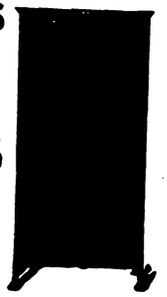

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The American Telephone Journal

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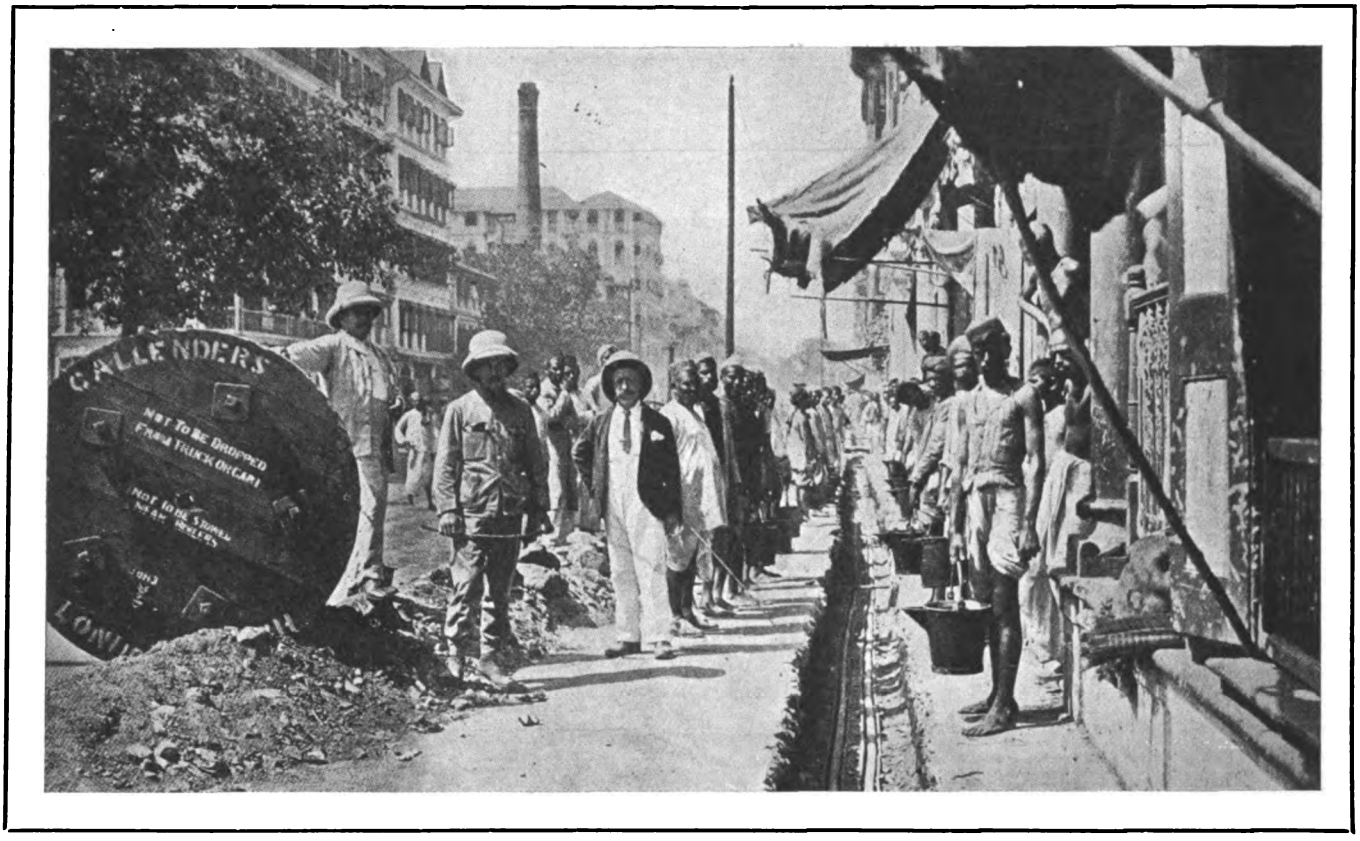
VOLUME 10 *SATURDAY, JULY 2, 1904* *NUMBER 1*

TELEPHONE CONDITIONS IN THE ORIENT

THE telephone has been used in the Orient for a number of years in a perfunctory manner, but it is only recently that its general use has been taken up in India and other Asiatic countries. It is quite probable that with the tremendous population, averaging in the neighborhood of the entire country of 400,000,000, that there is not over 15,000 to 25,000 telephones in use. In Egypt, the telephone system was erected by the Oriental Telephone Company and sublicensed to the Egyptian Government for a term of 25 years. In all, there is upwards of 3,500 miles of telephone lines, and exchanges from Alexandria, on the Mediterranean, up to Assoum, on the Nile, including the city of Cairo. In the Straight settlements the Oriental Company, which apparently has a monopoly of the telephone field in the East, has secured a franchise for 31 years from the Indian Government. In the cities of Calcutta, Bombay, Madras, Rangoon, Moulmien, Singapore and Hong Kong underground cables are to be run in accordance with an agreement made with the several governments, within the next four years. The license for operating in India proper was granted for a period of 60 years, on account of the large amount of work to be done and the tremendous outlay involved.



Laying Cable in Bombay, India.

A trouble that has confronted all propositions involving labor is the caste question. The Hindoos are divided into numerous sects, each sect of which owes allegiance to a certain god. For instance, there are Brahmins who worship Brahma, devotees of Vishnu, Parsees who worship fire, and Mohammedans. According to the ancestry of these various people so is their caste standardized, and we find that the average Indian household requires from two to twenty different servants. A man who draws water and is called *Bishti* would not dare to dig the garden for fear of losing caste. The man who operates the long swinging fans—called *punkas*—and who is termed a *punka-walla*, would not fetch the mail or cook the dinner. The lowest class are the *Majoors*, who dig the streets and are equivalent to the ordinary laborer in the United States. The wages these people receive vary from six to twenty rupees, or, in American money, from $2 to $7 a month. Low as this may seem, it compares favorably with the wages paid for coolies and other Oriental labor. Our illustration, taken in the city of Bombay, represents the laying of telephone cable through one of the main streets of the city. The peculiar construction of the ducts is worthy of notice. This method of construction is the one generally used, since the materials for the ducts can easily be made, being nothing more than troughs, and the cost of installing is consequently much lower than would be were all the materials imported.

In China, telephone exchanges have been in operation for a number of years in the cities of Canton, Hong Kong, Shanghai and Pekin. These systems employ Swedish apparatus almost exclusively, whereas in India the apparatus is German, French and English. In Japan the telephone development has been of a most rapid character. In fact, nearly all the large towns have telephone systems. At present, English apparatus is used exclusively, but it will soon be replaced by the American type of instruments. The Japanese are particularly adapted to the rapid assimilation of American ideas, and their telephone systems would compare favorably with many of the smaller ones in the United States.

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The construction of the aerial lines in Oriental countries necessitates the use of precautions which are not met with in European or American construction. For instance, long stretches of lines run through country districts and dense forests, where the trees and shrubs grow so rapidly and are so dense as to necessitate a constant vigil to protect the line from being short-circuited or grounded by the trailing creepers. Again, wild animals do their share of destruction, and it has been found necessary to use iron poles in many instances. A recent shipment by an American firm was made of 40,000 composite poles with iron bases and wooden tops. The reason for this composite construction being that the tigers and other wild animals would try to sharpen their claws upon the smooth wooden poles, consequently they would soon be worn away, whereas with the iron base and the wooden top the required protection was secured and, at the same time, the cost was considerably reduced.

NEW YORK INDEPENDENTS HOLD CONVENTION

(Reported by our Special Representative.)

BUFFALO was the scene of the Third Annual Convention of the New York State Independent Telephone Association on June 23d and 24th. When President George R. Fuller, of Rochester, called the meeting to order at 2.30 P. M. the first day, there were between two hundred and two hundred and fifty delegates present from all parts of the State, representing nearly four hundred prosperous Independent exchanges and toll line companies.

A radical departure was made by the Association in amending its constitution to provide that the membership will be composed of individuals instead of companies. The membership fee was also reduced from $5.00 to $1.00.

Special arrangements have been made with THE AMERICAN TELEPHONE JOURNAL, by which each new member of the Association on the payment of the membership fee of $1.00 will be entitled to a year's subscription to THE AMERICAN TELEPHONE JOURNAL.

This action was taken in order to increase the membership and usefulness of the Association. Secretary Lane, in explaining the action of the Association, said:

"Heretofore, with the annual dues of $5.00 a year, it has been very difficult to induce the companies to join the Association. By reducing the fee to $1.00, including a year's subscription to THE AMERICAN TELEPHONE JOURNAL, and opening the Association to individuals, we expect to have a very large membership of stockholders and official employees of Independent telephone companies. By the time we meet again, which will probably be next June at Albany, I confidently expect to have a membership of five hundred representative New York State operators. This will give us the strongest State organization of Independents in the country. With such a powerful association, we will be in a position to help each other in our mutual fight to give the people of New York State unequalled telephone facilities in a way never done before. We want every Independent telephone operator in the State to join our Association." (See coupon in the advertising pages of this issue.)

T. S. Lane, Sec'y N. Y. Ind. Tel. Assn.

The session was called to order by President George R. Fuller, who introduced Councilman Stoddart, who made the address of welcome on behalf of the Mayor, who was absent from the city.

Many delegates told of their experiences in various sections, organizing and installing Independent telephones. Among those who spoke were B. G. Hubbell, of Buffalo; J. S. Brailey, Jr., of Toledo, O.; F. M. Potter, of Syracuse; T. Harvey Ferris, of Utica; H. W. Blake, of Naples; E. B. Fisher, of Grand Rapids, Mich.; and A. M. Taylor, of Penn Yan.

Charles B. Hill, of the Frontier Telephone Company of Buffalo, extended an invitation to all the delegates present and their friends to visit the Frontier plant. At 4.30 o'clock the meeting adjourned so that the delegates could inspect the Frontier plant. They were taken all through the place from basement to roof.

A banquet was held at the Ellicott Club by the Frontier Telephone Company and the Inter-Ocean Telephone & Telegraph Co., the Buffalo long-distance company, which practically covers the State. It was without doubt the swellest function ever given by Independent telephone men. On every table was an Independent desk set, the wires festooned from the ceiling.

The speakers of the evening sat on a raised platform at the head of the table. The toastmaster was B. G. Hubbell, of Buffalo. On his left was H. D. Critchfield, of Ohio. On his right was Geo. R. Fuller, of Buffalo. The others at the speakers' table were: E. C. Lufkin and Charles B. Hill, of Buffalo; E. B. Fisher, of Grand Rapids, Mich.; J. G. Splane, Pittsburg, Pa.; W. D. Barnard, Philadelphia, Pa.; J. S. Brailey, Jr., Toledo, Ohio; Frank H. Mott, Jamestown, N. Y.; A. L. Têtû, Louisville, Ky.; and W. L. Cary, Cleveland, Ohio.

A good part of the next morning was spent in examining the manufacturers' exhibits in the parlors of the Genesee Hotel.

The election of officers for the ensuing year resulted as follows:

President, H. H. Persons, vice-president and general manager Frontier Telephone Company, Buffalo; First Vice-President, Howard Hendrickson, president Albany Home Telephone Company, Albany; Second Vice-President, Boyd McDowell, York State Telephone Company, Elmira; Treasurer, T. Harvey Ferris, Utica Home Telephone Company, Utica; Secretary, T. S. Lane, general manager Inter-Ocean Telephone & Telegraph Company, Buffalo. Executive Committee: Geo. R. Fuller, Rochester; H. H. Persons, Buffalo; B. G. Hubbell, Buffalo; Edward Davis, Binghamton; C. H. Poole, Utica; S. B. Rawson, Albany; J. S. Brailey, Jr., Utica; T. B. Basselin, Croghan; F. M. Potter, Jr., Syracuse; J. F. Stockwell, Oswego.

Papers were then read by W. H. Johnson, assistant general manager Frontier Telephone Company, Buffalo; F. M. Potter, Jr., general manager Syracuse Telephone Company; T. S. Lane, general manager Inter-Ocean Telephone & Telegraph Company, Buffalo; Geo. R. Fuller, secretary and manager Rochester Telephone Company; and M. S. Conner, chief engineer Stromberg-Carlson Telephone Mfg. Co., Rochester and Chicago. These papers were all most interesting.

Mr. Scowden, of Frewsburg, introduced the following resolution, which was seconded by Mr. I. H. Griswold, of Albany:

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Be it Resolved, That it is the sense of the New York State Independent Telephone Association that the territorial rights of any and all accredited Independent telephone companies, toll lines or exchanges shall be scrupulously respected, and that no Independent telephone company shall encroach upon the territorial rights of any Independent telephone company operating an efficient and comprehensive telephone service.

This resolution was unanimously adopted by the Association and is of special significance, not only to the toll line companies, but to the local exchanges operating in the State of New York. The principle outlined represents the foundation of the entire Independent telephone movement, tending as it does to safeguard the investor and guaranteeing him territorial protection. In other words, it clearly defines the policy of the Independents, which is to carefully refrain from competing with each other. Any attempt on the part of one Independent telephone company to build competing exchanges and toll lines in competition with other Independent telephone companies, thereby depriving them of a portion of their revenue, should be discouraged throughout the entire Independent field, and any company doing this directly or indirectly should be subject to the criticism of Independent telephone interests generally.

The special traffic committee, consisting of S. B. Rawson, T. S. Lane, and Edward Davis, submitted to the executive committee a careful report near the end of the session. It is of such interest that it will be printed in full in an early issue of THE AMERICAN TELEPHONE JOURNAL. The report was considered by the executive committee and adopted by the Association.

EXHIBITS OF THE MANUFACTURERS

ON entering the corridors and parlors of the Genesee Hotel, delegates to the Convention found not cannon, but telephone apparatus to the front of them, telephone apparatus to the right of them, telephone apparatus to the left of them, and to make it more impressive, the genial representatives of the manufacturers were behind them, if they attempted to steal away without a good look. Probably no Independent Convention outside of the Interstate or National has had such a representative collection of manufacturers' exhibits as was to be found at Buffalo.

We will endeavor to give the reader a slight conception of the "dangers" of the delegates, first commencing with

THE CENTURY TELEPHONE CONSTRUCTION COMPANY,

of Buffalo, N. Y., which occupied parlors 116 and 118. The company was ably represented by B. L. Moore, general manager, Gustav F. C. Bauer, sales and advertising manager, and Will W. Kidney, engineer. The parlors were beautifully decorated with palms and cut flowers, the red peonies especially forming a splendid setting for the exhibit. A complete switchboard and powerboard, just turned out of the Century factory for the Newark, N. Y., Telephone Company, formed the principal exhibit. The powerboard is so arranged and the line signals so wound, that a complete test can be made for locating grounds on either side of the line in a minute. The switchboard is a two-position, common-battery, transfer-type, equipped for 320 lines. The powerboard is exceptionally attractive, being equipped with Crouse-Hinds tubular arm switch and Weston voltmeters and ammeters.

The Century Company showed a full line of magneto and common battery telephones; its platinum electrode transmitters, new line signals for either magneto or common battery boards, new jacks, lamp jacks for lamp signal boards, protected opals for supervisory lamps, small type wall bell-signal switchboard for rural lines, and a 100-line magneto board with 50 drops equipped. A new composite device for building up toll lines for use in telegraph work attracted much attention. It is so arranged that a complete test of toll lines can be made both in and out for opens, shunts, grounds, etc. The telephones exhibited were all mounted on two antique racks made on the mission style. The company's new desk set in which the hook can be inspected without taking the receiver off the hook and its binding posts made for regular cord tips also formed an interesting part of the exhibit.

On the next floor of the hotel, occupying two large rooms was

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY,

of Rochester and Chicago, which had an exhibit of some of its telephones and switchboard apparatus. Samples of underground and switchboard cable and cords were also shown. Great interest was evidenced in the line of new relays for central energy switchboards, which were here shown to the public for the first time. The new generators that the company has just put on the market were the subject of much comment by those who are interested in general call systems and toll line work. M. S. Connor, chief engineer, and James S. Gibson, who represented the company, had several fine photographs of exchange installations. Not the least interesting part of the exhibit was a line of rough brass castings for generators, desk stands, transmitters, and switchboard parts. These were shown just as they came from the sand moulds in the unfinished state, and illustrated well the manner in which the Stromberg-Carlson Company produced apparatus from the raw material.

The magnificent mahogany cabinet lamp signal, full central energy switchboard and telephones, forming the private branch exchange system of the Genesee Hotel, which is connected with the Frontier Telephone Company's exchange, and which was greatly appreciated by the convention delegates, was manufactured by the Stromberg-Carlson Company.

In parlors 104 and 108, F. F. Sapp, sales manager, George B. Pratt, Ohio State representative, and Raymond Hendrickson, Eastern representative, had a beautiful exhibit of apparatus made by the

NORTH ELECTRIC COMPANY,

of Cleveland, Ohio. The company had a section of switchboard equipped with indicating four-party lines, selective ringing keys with telephones connected in order to demonstrate how the system worked. A new type of breastplate transmitter, which the company has just put on the market, the object of which is to bring the transmitter within easy speaking distance of the operator, and at the same time to have it in as nearly a horizontal position as possible, was the subject of much favorable comment. The company also had a central energy lamp signal board and a magneto board connected with various types of telephones mounted on racks. An electrician from the Cleveland factory explained the working of the various boards to the delegates. A new desk set and the company's new type of non-adjustable receiver were also exhibited. An interesting part of the exhibit which also formed a suitable background for the exhibit, were 40 enlarged platinum photographs of installations by the North Electric Company, the originals of which were taken by Mr. Sapp.

THE F. BISSELL COMPANY,

represented by E. B. Terry, had a good display of construction tools, among which might be mentioned: cable trolley cars, pole top terminals, pole seats, marlin cable hangers, samples of its bullfrog brand wire, and a new type of conduit rod. It also exhibited samples of its "Security" potheads and cable sleeves. These were formerly known as Novelty potheads and sleeves, but have just been purchased from the New Haven Novelty Machine Company and will now be manufactured exclusively by the F. Bissell Company.

THE STERLING ELECTRIC COMPANY,

of Lafayette, Ind., was represented by S. C. Platt, New York representative, in Room 502. Mr. Platt exhibited a full line of

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telephones and switchboard parts, all standard products of the Sterling factory.

THE MILLER ANCHOR COMPANY,

of Norwalk, Ohio, had an exhibit in Room 120, in charge of G. H. Miller, the president of the company. A neat souvenir was distributed, being a small reproduction of the company's guy anchor.

THE MCINTOSH HARDWARE CORPORATION,

of Cleveland, Ohio, manufacturers of telephone supplies, was represented by E. J. Newton.

THE AMERICAN STEEL & WIRE COMPANY

did not have an exhibit, but distributed information regarding telephone wire.

METHODS OF HANDLING TOLL BUSINESS*

BY T. S. LANE.

ANY system for handling tolls must take into consideration compensation of station originating business, the establishment of uniform rates, routings, division of mileage among different companies, method of settlement and a multitude of minor details. Such a system must possess three qualifications: it must be elastic, simple and equitable. Elasticity means the ability of the system to adapt itself to any territory, any combination of toll lines and exchanges, one which will not be interfered with by special routings or by other conditions peculiar to some particular locality, in other words, the method must be sufficiently flexible to provide means to properly account for and handle a toll message from any point in New York State to any other point in New York State, and by the same means, must take care of business between points in New York State and points in other States, and this must be accomplished without departing from the general policy adopted.

As to the second qualification, a system to be simple must be one which can be easily understood by the manager of any exchange or any toll line company whose business is settled in accordance with its provisions, and must be free from unnecessary detail. The charges and credits for each company must be easily understood and so made that each company receiving a statement may readily check the statement, the mileage division must be so plain that any one with a standard map can be assured of the accuracy of the statement rendered, or can detect errors if such exist. A simple system is one which accomplishes a maximum of results with a minimum of labor.

Any successful system covering division of toll revenue must provide for a fair and equitable distribution of receipts, not only between connecting toll line companies, but between the toll line company and exchanges with which it connects. A system designed for the particular benefit of the toll line companies has a tendency to reduce interest in the development in this important branch of the business by the exchange, and leaves small inducement for the local companies to provide prompt and efficient toll line service. A division of revenue which is unprofitable for the toll line company gives no incentive to the toll line company to extend and perfect its system. Local exchange companies and toll line companies are mutually dependable, each upon the other. The exchange must have the toll line business to meet the demands of its patrons. The toll line company must have the local exchange to produce the business which it handles, all of which demonstrates the necessity for an equitable plan of revenue division.

Following the general qualifications are a number of specific problems which must be considered and definitely decided, such as rates, mileage, time limit of messages, night rates, method of dividing revenue between connecting toll line companies, method of dividing toll revenue between exchanges and toll line companies, method of tariff division betwen groups of companies, method of reporting toll business, method of transmitting toll messages, franked business, accounting, forms to be used, etc.

To arrive at a uniform and equitable schedule of tariff rates, many toll line companies have found the so-called "block system" of great assistance. The application of the block system is as follows:

A map of the territory to be covered is sub-divided into squares of five or ten miles and each square numbered. This gives every station and exchange in the entire territory a block number whether station is connected or not. As the mileage between any two given points must determine the toll rate between said points, an easy way of arriving at the mileage is to consider the air-line mileage between any two given stations as being the distance represented by the air-line mileage between the centers of the respective blocks in which said stations are located. In this way the air-line mileage between the center of each block to the center of all other blocks is ascertained at the start, and, having determined upon the rate per air-line mile, which is to govern the tariff, the rate between any station and all other points covered by the block system is immediately ascertained by referring to the rate governing the block in which the station is located. As soon as a new station is connected, it is only necessary to notify all other stations of the connection, together with the number of the block, and all stations by this means are informed as to the rate to the new connection.

The advisability of determining rates by the old method formerly used by the Bell Company, based on pole line mileage, is so obsolete as to call for no discussion as to its applicability to a general system of handling toll business. Without competition, the plan of basing rates on pole line mileage is doubtless practicable, but with two competing interests in any field, an attempt to meet competition and base rates on pole line mileage would result in a schedule of rates which would be unsatisfactory to the public and which would not represent intelligent competition. Between two points, one company might have a pole line mileage of 200 miles, and a competing company a pole line of only 100 miles. The company basing its rates on the air-line distance would be more liable to be right from a competitive point of view than would the company adopting pole line mileage. On extremely long hauls between large centers, for instance, between Buffalo and Philadelphia, it might be advisable to modify the air-line mileage basis on account of extraordinary pole line mileage as compared with the air-line mileage, and in fact any rates based on the above mentioned plan can be easily regulated by issuing special rates to meet extraordinary conditions.

As to the amount of tariff to be charged per air-line mile, there is a wide difference of opinion. Some operating companies claim that a revenue of one-half cent per mile leaves a margin of profit. Others advocate a minimum charge of six-tenths cent per mile. A schedule of tariff rates, based on air-line mileage, should conform as far as possible to a charge of two-thirds cents per air-line mileage with a minimum of six-tenths of a cent per mile, and no rate should be made of less than 10 cents between any two toll points.

The question of time limit for toll messages is one which merits careful consideration. The Bell Companies long ago discarded the five minute rate, and many of them are to-day making a low rate for a one minute service. The making of five minute rates by the model plants, from an engineering point of view, with the very the start, the theory being that the Independent companies in offering a five minute rate at the price their competitors were charging for three minute service would be a great argument in favor of Independent toll line service as

* Abstract of paper read before N. Y. State Ind. Tel. Assn. at Buffalo, June 24, 1904.

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against other toll line service. This theory is wrong, for the following reasons:

The great majority of toll users are business men, who regard promptness as an essential feature of good toll service, and especially valuable. In the majority of cases the business man can complete his conversation in three minutes if he knows that three minutes is the limit, and he would rather reach his party quickly on a three minute basis than to have the privilege of talking five minutes and experience long delays.

In meeting competition, toll line service is considered chiefly from two points of view, promptness, and clear transmission, and of the two, prompt service counts for more, if anything, than the other, although both are essential. In the keen competition now under way between the two opposing telephone interests, the toll line company which handles calls without delay will have all of the business that it can handle. In brief, the toll user prefers a three minute service which he gets to a five minute service for which he waits. It has been argued that "the five minute time limit is good advertising for the Independent company, and that the toll user does not consume any more time than if limited to three minutes." This is false reasoning. If the advertisement does not make a sufficient impression on the toll user to cause him to make use of his full time limit, it has no value from an advertising point of view, and on the other hand, toll users time their conversations and make use of the extra two minutes simply because it cost nothing, thereby unnecessarily blocking the service.

The toll situation of the Independent companies to-day is as follows:

The toll lines of every Independent company are crowded to their utmost capacity, and so rapid is the increase of business that although hundreds of workmen are employed in installing additional toll circuits in all parts of New York State, the increase in business is constantly ahead of the capacity, and it is only by carefully watching operating conditions and keeping down the limit on messages that toll line companies can hope to take care of the volume of business which is being given to them. Under present operating conditions, a line between two stations working on a three minute schedule should be able to handle not less than sixty messages daily. In localities where the five minute rate is in force then the number of messages handled daily when the lines are worked to their utmost capacity is scarcely more than half of this number. In many exchanges in western New York the original limit on toll messages was five minutes, and although the change was made to three minutes with considerable doubt as to the result, the complaints against this change have been so few as to scarcely warrant attention, and no company which has adopted the three minute schedule will advocate a return to the five minute schedule.

Experience has demonstrated that less than 25 per cent. of the calls made under the three minute limit plan use over-time. For instance, during the month of April one exchange originated 3,663 messages and received 4,488, a total of 8,151 messages, and out of these calls only 306 messages were over-time messages. The Union Telephone & Telegraph Company, of Western Pennsylvania, and the United States Telephone Company, of Ohio, have successfully used the three minute schedule for some years, and express themselves as satisfied with the results.

A uniform scale of reduced night rates is desirable to apply between the hours of 6 P. M. and 6 A. M., when toll lines are comparatively idle unless an inducement is made for this period. A reduction in rates exceeding 25 cents can be made to profitable advantage, the minimum reduction being 50 per cent. No night rate on messages exceeding 25 cents to be less than 25 cents.

A simple and easily understood method of dividing revenue between connecting toll line companies is as follows:

Deduct from the total revenue represented by interchanged business the originating commissions due each company, the remainder of the toll tariff to be divided between the connecting companies in proportion to the ratio existing between the air-line distance from point of origin to point of transfer and the air-line distance from point of transfer to the point of destination. For example, let "A" represent a toll station on one company's lines, "C" a toll station on another company's lines, and "B" the meeting point of the lines of the two companies. Suppose that the air-line distance from "A" to "B" is 20 miles and the air-line distance from "B" to "C" is 10 miles, and the number of messages during one month between "A" and "C" one hundred. The total mileage represented by the line from "A" to "B" will then be one hundred times 20 miles or 2,000 miles. The total mileage represented between "B" and "C" will be one hundred times 10 miles or 1,000 miles. The total mileage of the two companies for business between "A" and "C" will be 3,000 miles. If the rate between "A" and "C" is 30 cents, the toll revenue represented will be one hundred times 30 cents or $30.00. If each company deducts 25 per cent. for originating the business, there will remain $22.50 toll tariff subject to mileage division, and of this two-thirds should go to the credit of the company owning the line from "A" to "B," and one-third to the company owning the line from "B" to "C." Following out this plan of mileage calculation, the credit for each company on a month's business between all stations on one company's lines and all stations on the other company's lines can be included in one general settlement and the exact amount due each company on mileage easily ascertained. In arriving at mileage settlements between connecting toll line companies, each company should assume the mileage of its subsidiary connections and should make a division of its share of the new revenue with such connections.

In reference to the division of tariff between toll line companies and exchanges having no toll line mileage, it must be borne in mind that the toll line companies have their entire investment tied up in a system from which their sole revenue is toll business, and although exchanges at the termini of the toll line may represent a much larger investment than is represented by the toll line, the investment in the exchange depends only in a small measure on the toll line business which is handled by the exchange, with very little additional investment. For instance, a toll message transmitted between two exchanges of 1,000 subscribers each, over a toll line having two circuits, involves the actual use for the time being of only one-thousandth part of the investment in the exchange, but at the same time, ties up one-half of the entire toll line system.

There can be no dispute as to the fairness of basing commissions paid to exchanges entirely on originating business for the reason that a large part of the expense incurred by the exchange in handling toll business arises from the necessity of making collections, and it seems reasonable that the exchange, which assumes this part of the transaction, should be entitled to a greater compensation than the exchange which merely delivers the message.

METHOD OF MAKING CHARGES AND GIVING CREDITS.

In making charges against and giving credit to various companies dividing toll revenue, the following method is used:

Charge each company with "tolls sent paid," "tolls received collect," and "messenger fees collected." Give each company credit for "messenger fees paid," "commission on originating business" and "mileage" (as shown by mileage statement). To get this information it is, of course, necessary for each company originating business to make a careful record of the business transacted with each station as follows:

"Number of messages sent," "number of messages received," "over-time," "amount of tolls sent paid," "amount of tolls sent collect," "messenger fees collected," "tolls received paid," "tolls received collect," "messenger fees paid." So-called "deadhead messages" should be entirely eliminated and operators required to make a charge ticket for all messages, no matter by whom sent or for what purpose. A record can be made of company business subject to frank, and an adjustment of same made between companies interchanging business. Some contracts between large toll line companies specifically set forth that neither company shall carry free business for the other.

TRAFFIC ASSOCIATIONS.

In many localities, a limited territory is covered by a series of short connecting toll lines, each line owned separately and under separate management, and the division of joint revenue between such lines presents a problem more complicated than the division

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between large toll systems. In some instances, this problem has been solved by local joint traffic associations. The membership of the association is composed of representatives of each of the connecting companies, the plan of revenue division being similar to that outlined in the present discussion. The formation of local associations should receive careful consideration and should be encouraged.

In Chautauqua County are nine short toll lines, extending from Jamestown via Sherman and Mayville to Westfield, and thence east and west from Westfield along the Lake Shore. Some time ago these companies formed a traffic association for the purpose of establishing uniform rates and adopting a system for handling the business interchanged among themselves, as well as business to points outside of their district. This association, known as the Independent Telephone Clearing Association, with its office at Sherman, receives a monthly report of the business transacted from each of the companies making up the association. The association employs a secretary, who maks a division of the revenue from the reports received, rendering each company a statement of its charges and credits. Remittances are made direct to the association secretary, who in turn makes remittances to those who have balances due them. The secretary's compensation is based on a certain amount for each message handled by him in the work of clearing the entire business, the amount being fixed at something like one-half cent per message.

The method of dividing revenue derived from business going to points on other lines outside of the association lines is as follows:

The association lines connect with the lines of the Inter-Ocean Telephone and Telegraph Company at Jamestown and with the Union Telephone and Telegraph Company at Corry, Pa. Each of these toll line companies renders a monthly statement to the association treating the entire group of lines as one toll line company. If the Association has a balance due it from toll line companies, it goes into the association fund for general distribution and is disbursed among association members according to mileage furnished by each.

The local association has a great advantage in being able to come in close contact with its members and to know thoroughly the territory which is being covered. Switching fees are entirely eliminated in our interchange of toll business throughout the State, and should be entirely done away with, as their general adoption acts as a great handicap to the successful conduct of the toll business and gives competing interests a great advantage over the Independent toll line systems. There has been some discussion relative to the formation of a State traffic association for the purpose of clearing interchanged business between the larger toll line companies. This class of business represents, at the present time, a comparatively small amount, and we are not ready for an association of this kind for the reason that the revenue represented is not sufficient to warrant the expense necessary to maintain and conduct such an association.

So far as Western New York is concerned, the toll line companies are having no difficulty in arriving at a division of revenue at a very small expense; in fact, at a cost of less than two per cent. of the gross business cleared. The real need is for a method of making a fair division in localities covered by short lines interchanging a large volume of business. If these different localities can be formed into associations, organized on similar plans and using similar methods, the results will be satisfactory throughout the State, and from these smaller associations we will gradually work into one joint traffic association in which the missionary work will have been accomplished. No manager of a State traffic association could at the present time be familiar with the conditions in all localities covered by short connecting lines, and the serious complications which arise in establishing rates, regulation and routings come from just such localities.

A still better plan for bringing about a uniform toll service would be a concentration of short lines under one management, for instance, in certain counties in which a dozen or more separately controlled lines are interchanging business, an association or even a corporation could be formed from among the various connecting companies, which could lease all the connecting lines and operate them as one line, allotting to each company a division of the net revenue in proportion to the pole line mileage furnished.

"Unity of control" is a phrase which may not appeal particularly to a gathering of independent association men, but at the same time the more we can intelligently concentrate "control of operation" of our toll lines, the nearer we come to perfection in uniform and efficient toll service.

ARE PRESENT BUSINESS METHODS SATISFACTORY?*

By F. M. Potter.

An overwhelming demand by the people and the refusal to grant lower rates by the Bell Company at a period when its monopoly was undermined by patent expiration, gave birth to the opposition telephone movement.

The general type of telephone and the general business plan inaugurated by the Bell Company have been universally followed to this day. It may be that a movement having its birth but a decade ago can be excused for not putting into existence at once a series of methods far different from those of a successful pioneer corporation. But defects in these methods have been made apparent, and it is evident that the future telephone business of any community is to be done by that company which will most satisfactorily cater to the wants of its patrons, and which will take the public into its confidence, and prove that its fundamental business object is to grant to its customers every possible advantage regarding quick service, courteous fair treatment, and manifest a generous desire to incorporate into its growing business every available benefit of improved apparatus and improved practice.

The Independent telephone interest to-day is a giant, with a giant's strength, but there still lies within a far greater and more powerful latent force in its army of active interested citizens that is shown by its remarkable growth.

The American Bell Company, establishing a business practice based upon its strong, arrogant and fortified position, assumed to bind the unfortunate who by need was compelled to pay its exorbitant rate to a long term contract. The early business policy of this company, embittering every section alike had the effect of bringing down a general desire for retaliation from its users. The proof of its error is vividly before all. In its legal and commercial tactics and in patent litigation it has met continuous defeat, leaving the Independents to-day a factor in the great commercial future of the United States.

The more prominent weaknesses of the early system have been met, and many of its imperfect features improved upon and perfected. But during the struggle the telephone conditions have altered. From a luxury enjoyed by the wealthy the telephone assumes such a position to-day that no one will deny that for both business and social advantage to all classes it is a substantial and positive necessity.

In recent articles appearing in the telephone journals the abuses of the unlimited service have been pointed out, with illustrations and comparisons drawn from the methods of railway,

* Abstract of paper read before N. Y. State Ind. Tel. Assn. at Buffalo, June 24, 1904.

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steamship, express, gas and electric lighting companies, and other public service corporations. To what ebb would the securities of these corporations fall were they to put into effect the present telephone business system? We may not deny the abuse—the Bell company has perceived it for years. That company attacks the fault with a measured limited service. Some of us are attempting to profit by their endeavor to extract themselves from their own snare. The attempt is wrong; it will bring many benefits, but nevertheless it is from a business standpoint radically wrong.

The cost, the annoyances and the slackened service due to an attempt to make the operators manual recorders, have brought toll-collecting devices into extended service, especially in the larger cities; this method, eliminating the greater faults, has proven in may respects quite satisfactory. The general commercial business practice of charging the user for the amount of service consumed seems to be right, being as it is satisfactory, just and equitable to both subscriber and company alike.

To secure the greatest amount of money from a given community for a given commodity at a low cost seems to be the ideal business design. The telephone companies have just this chance. Why may it not be practicable to establish a toll-service system, and place telephones in for any one who is sufficiently able to pay a small guarantee or who is able to secure a guarantor, as demanded by the light and gas companies for meter installation? Let the guarantee be a minimum, as low as practicable; let your service be extensive; make your income a direct product of the service given. Your income will grow with the demand.

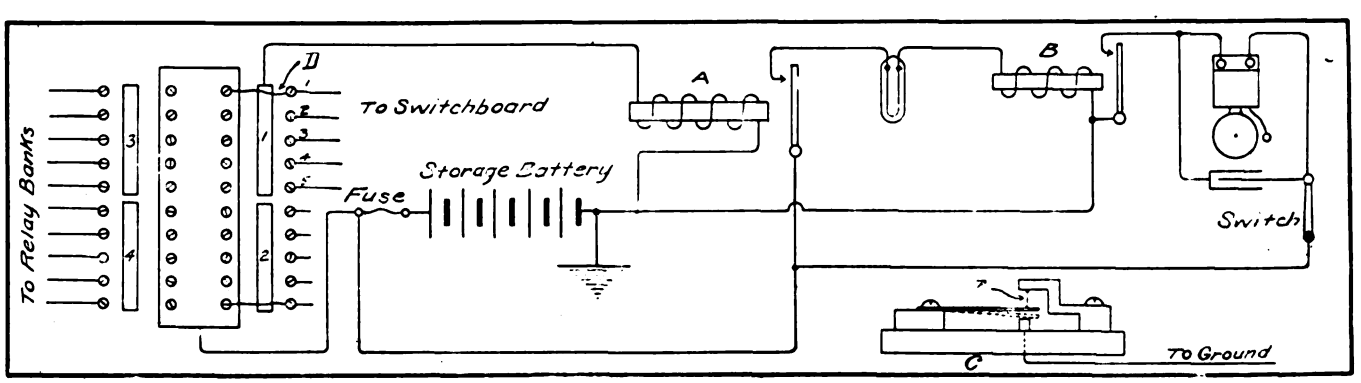
Every connection made through your switchboard means a drop into your financial coffers. You believe the practice will call for a deliberate subsiding of your exchange activity. It will, indeed, and you will find immediate relief of operators working under high pressure service. You have eliminated the non-paying element, legitimate service is substituted, and as the cost of operators, exchange operation, depreciation of apparatus, wear and tear upon cords, jacks, etc., is directly proportional to the service, your business therefore secures at once large immediate benefits. With a minimum charge the company is guaranteed its fixed charges; with its lower rates it has guaranteed to it a broadened and more extensive telephone plan than is now in existence. It may be expected to broaden the scope and value of the telephone and stimulate its use to such an extent that the revenue derived from a measured service call will far surpass any income secured through the contract system. If it be objected that toll-collecting apparatus and service measuring devices for the subscriber or for the exchange have not reached the highest stage of perfection, this is no objection to the system itself. The system once conceded to be correct, there is little doubt but that inventive genius will produce the requisite mechanism. Should the plans thus outlined be developed to a complete practical system, we might well hope to see installed throughout the land a telephone system satisfactory, stable and vast in comparison with that in existence to-day.

With such a system a telephone corporation is in a position where its securities would not be sold on the basis of the number of contracts it has been able to bind its citizens to and the term period for which these contracts have been taken, but these securities would be sold upon the basis of the population and the character of the community. The investor would know that if the property is properly built and operated under good management he would receive remunerative returns. He would gauge the telephone business as he does that of the gas, the electric light, or the trolley. Telephone bonds and stocks would have a just valuation placed upon them; and thus under more stable conditions and consequent stimulated investment, future telephone business and securities would leap by stride and bound to a position second in standing to none in the commercial world.

AN INDICATING FUSE ALARM

By C. S. Bunderman.

ONE of the latest inventions, and probably one of the most valuable as a time saver in clearing trouble, is the automatic indicating fuse alarm. The value of this adjunct to the fuse panel is the fact of its reliability and also its aid in reducng that bugbear of the traffic manager, the "written complaint." The initial cost is higher than the ordinary fuse, but this additional expense is repaid in the advantages it affords for the rapid location and clearing of trouble.



Circuit of Indicating Fuse Alarm.

The method of application to the circuit is shown in the figure, and *C* is a diagrammatic view of the fuse itself. It will be noticed that this fuse is of a peculiar construction, and consists of a spring which is held from a ground contact by means of a short piece of fuse wire. Now when for any reason this fuse blows, the spring makes contact with the ground and closes a circuit through a relay which lights a lamp and also closes a second relay that causes a signal bell to ring. The relays bell and lamp should be placed as near as possible to the fuse panel. It will be noticed that the fuse panel is divided off into sections, each section having a separate ground conductor connected in series with a relay, thus when any fuse for a section is opened the relay of that particular section is closed, and the lamp is lighted and stays lighted till the fuse is replaced. A single point switch is provided to open the bell circuit to prevent the noise which might be objectionable till the defective fuse has been located and replaced.

The number of circuits to each ground is dependent entirely upon circumstances, but it is preferable not to have too many or else the value of the fuse as a time-saving device is eliminated.

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INDEPENDENT SITUATION IN MAINE.

THE great development in Independent telephony has been in the Middle West. There occurred the first revolt from the tyranny of the Bell monopoly, when the expiration of Bell patents made revolt possible. As when a pebble, tossed into a pond, causes a disturbance which reaches out in ever-widening circles until they encompass the whole surface of the water, so from this initial revolt the movement has spread to the North, to the Pacific Ocean, to the great Southern States, and East to the very heart and center of the Bell stronghold. The Middle West is still the hotbed of Independent telephony; the East is still the great stronghold of the Bell monopoly. This is particularly true of New England, which may be called the fountain head of the Bell monopoly and the source of Bell inspiration.

This being the case, the people of the country, who always believe in fair play and a healthful competition, can look on complacently at the great stir which is being made in the State of Maine at the present time in favor of Independent telephony. That the question of telephone franchises and telephone competition, of broken pledges on the part of the Bell officials, and defeated hopes on the part of citizens, struggling in the grasp of a monopoly, should be made an issue of a gubernatorial campaign, and should stir up the people from one end of the State to the other, augurs well for the future of Independent telephony. The people will eventually come into their rights.

Maine is on the eve of a great battle for the Republican nomination for governor of the State. The most sensational element in the controversy is the issue between Lewis A. Goudy, president of the Northeastern Telephone Company, and Hon. William T. Cobb, a candidate for the nomination. Mr. Goudy has charged that Mr. Cobb was influential in obtaining a telephone charter from the Maine Legislature, on the plea that it was to be a competitor of the New England Telephone Company, and to be conducted in the interest of the people as against the Bell monopoly, of which the Bell company is an important branch. Mr. Goudy further alleges that this was the basis on which the charter was granted, and that having obtained it, Mr. Cobb was one of the party that sold this franchise to the New England company, and thereby broke the promises made to the people.

Mr. Cobb has replied to this letter, tacitly acknowledging the sale, but denying that any promises had been made. In an open letter, spread broadcast over the State, Mr. Goudy substantiates his charges and places the candidate for governor in a very bad light before the people. The Republican press has taken hold of the matter and is discussing the situation in vigorous terms, and the people seem very much aroused everywhere. It seems reasonable to infer that this alleged act of perfidy on the part of Mr. Cobb may cost him the Republican nomination.

The Lewiston *Journal*, after reciting the facts in the controversy, says editorially:

"More than that (namely, the pledges made to the Legislature), the Lewiston-Auburn city governments gave away valuable franchises to Mr. Cobb's incorporated interests on the distinct agreement that Mr. Cobb's company was out to lift the yoke from the necks of the people. We all could seem to see ourselves emerging from the melancholy days of franchise grab into the sunrise land of the Real Thing. We know what happened. The Eastern Telephone Company sold out the people but kept themselves. The Eastern company also delivered its component parts to the monopoly which it scorned and embraced on successive days. The promises were broken, the public betrayed, the Legislature of Maine unwittingly had fooled with a beautiful and polished brass brick. The city governments of Lewiston-Auburn were played with for income promised the people, but pocketed elsewhere. . . . The Eastern company, of which Mr. Cobb was one of the directors, sold out to the New England Telephone Company at a price, including, as it is stated, $10,000 for the franchise. That franchise was the free gift of the legislature and of the city governments of Lewiston and Auburn, bestowed on pledges of competition. By that sale and by that betrayal of the people the Eastern Telephone Company forced the New England Telephone Company to assess the dear people to pay dividends on what the people gave away on the pledge that they should be blessed with lower charges."

THE RESULT OF BETRAYAL.

With the further details of this unseemly affair the public at large is not so much interested; but it is a healthful sign when the people of a State like Maine, a veritable stronghold of the Bell interests, are up in arms against a monopoly which has stifled competition and raised prices in utter disregard of the people's rights and obligations of honor. The question of whether Mr. Cobb has or has not been guilty of securing a telephone franchise by hoodwinking the people and the legislature into the belief that he would give them relief from the tyranny of Bell monopoly does not appeal to the AMERICAN TELEPHONE JOURNAL. If Mr. Goudy's charges are true, certainly this is not the first time that a legislature has been presented with a "gold brick;" it is not the first time that the people have been defrauded by false promises, and it is not the first time the Bell monopoly has been guilty of these things and worse.

The really vital point in the matter is the fact that the people are resenting such treatment. The poor, dear people, who have been walked over and trampled upon and robbed by this and other monopolies, are up in arms. The worm has turned, and has turned at such a critical time that one man's political ambition may be sacrificed in the first outburst of righteous indignation.

The incontestable fact that in the State of Maine an alleged Independent telephone company, which had been eagerly welcomed by the people as affording relief from the Bell monopoly, has sold out to the Bell people, who have at once raised telephone rates throughout the field of operation, need not surprise us. The same thing has been done many times before. It is a favorite method of stifling competition on the part of the Bell interests. THE AMERICAN TELEPHONE JOURNAL has repeatedly sounded the alarm and called public attention to these methods.

The significant part of the whole transaction is the public clamor which is awakening the echoes in the old "Pine Tree State" in favor of Independent telephony. Good will come of it. Whether Mr. Cobb is defeated or elected need not concern us. In this stronghold of Bell monopoly, causes are at work which are bound to weaken this monopoly and extend the Independent movement.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

FOREIGN CORPORATIONS IN PENNSYLVANIA.

The Farmers' Telephone Company is an organization incorporated under the laws of West Virginia. Please inform us what steps must be taken to gain authorization to do business in Pennsylvania. K. R. T.

BEFORE a foreign corporation can lawfully do business in Pennsylvania, it must file a statement in the Secretary of State's office, showing its object, place of business, and the name of an agent in Pennsylvania on whom process may be served. Kilgore v. Smith, 122 Pa. St. 48; Commonwealth v. Oil Co., 101 Pa. St. 119.

PENALTY FOR FAILURE TO DELIVER MESSAGES.

THE State of Mississippi has a statute to the effect that if any telephone company "shall receive a message or matter for transmission," and shall fail to transmit correctly and deliver it within a reasonable time, the person injured shall be entitled to recover from the company a penalty and damages. Code 1892, sec. 4326. One Sanders requested the agent of the Cumberland Telephone & Telegraph Company at Charleston, Miss., to call a person in Sumner to the telephone so that Sanders might communicate with him. He made a similar request as to two other persons. None of the requests were in writing, nor were any fees paid. None of the requests were complied with. Sanders accordingly sued the company before a justice of the peace and recovered a judgment in each case for the statutory penalty of $25, but nothing was recovered for actual damages. The case was finally appealed to the Supreme Court of the State. The court reversed the judgment for the plaintiff. It said that the section was a highly penal statute and must be strictly construed. "We are clearly of the opinion that the only messages or matter referred to in that section are written or printed messages or matter. The very language of the statute clearly shows that. The messages or matter the failure to transmit correctly and deliver which subjects the telegraph and telephone companies to the penalty therein provided, are declared to be messages addressed to a person, etc. These messages, it is said, must be transmitted correctly; that is, correctly as written. To transmit correctly and deliver the same—that is, the messages or matter so addressed—is the precise language used. * * * It is our business to construe the statute strictly as it is now framed, and under the familiar principles of construction applicable to penal statutes, we are of the opinion that what took place here is not within the purview of the statute."

Cumberland Telephone & Telegraph Co. v. Sanders, Miss., 35 S. 653.

INTERFERING SUBWAYS.

A CONTROVERSY arose between the Western Union Telegraph Co. and the Electric Light and Power Company, two underground occupants of a public street in the city of Syracuse, N. Y., each having a franchise granted by the common council. The complainant's franchise, which was earlier in date, permitted it to construct a subway or conduit under certain streets, and to place wires thereunder "necessary in the operation and conducting" of its telegraph business, plans and specifications to be approved by the commission of public works and the common council. Among the many limitations and conditions of the grant, was the provision that no "exclusive franchise to use the streets and public places of the city, or any of them, for a subway or for any other purpose" should be deemed to be conferred upon the plaintiff, and that "all rights and privileges herein not specifically given, are expressly reserved by the common council." Under this permit the plaintiff constructed a subway. Subsequently, the common council, upon similar conditions, gave the defendant a franchise for a subway, to conduct and distribute "electricity for light, heat, and power for public or private use." The defendant built its line in some of the streets already occupied by the subway of the complainant, and in some places its structure was placed above and parallel to the line of the plaintiff, and at a distance of about one or two feet therefrom. The plaintiff brought suit for an injunction to restrain the defendant from using or maintaining its subway as located in the street in the beginning, and compelled it to remove its line therefrom. The theory of the complainant was that the location of the defendant's subway interferes with access to the subway of the plaintiff for the purpose of making repairs, and that it will "necessarily cause great inconvenience and expense." The trial court did not grant an injunction, but required the defendant and the city of Syracuse, which was joined as a defendant, but did not defend, to execute a bond to indemnify the plaintiff against any loss it might sustain by reason of the location of the defendant's line.

The Supreme Court of New York held that the result of the action of the lower court was an adjudication in effect, that a resort to equity was necessary because the requirement of a bond to indemnify against damages showed that there was an actual remedy at law through the recovery of damages as compensation. The court further held that the plaintiff had no right to object because the city subsequently gave another company the right to locate its subway so close to the plaintiff's subway as to cause expense in making repairs, if such subsequent location was not an unreasonable interference with the plaintiff's right. The court was divided in its opinion, four judges agreeing to the decision as above stated, and three justices dissenting. Among the majority was Chief Justice Parker, who is talked of as the next Democratic candidate for President.

Western Union Teleg. Co. vs. Elec. Light & Power Co. (N. Y.), 70 N. E. 866.

DAMAGES FOR REFUSAL TO CONNECT.

IN the case of Haber, Blum, Block Hat Company vs. Southern Bell Telephone Company, the Supreme Court of Georgia has affirmed a judgment for the plaintiff. The court held that where a subscriber to a telephone exchange at one place desired to communicate with his regular counsel in another place, was refused the long distance connection, contrary to an alleged contract, and avers that in consequence of such refusal he (the said subscriber) paid unnecessarily and unjustly a delinquent employee $175 to get rid of him and to recover from him certain property intrusted to him, and to avoid a threatened law-suit, it not appearing that such absent counsel could have controlled such delinquent employee, such payment cannot be recovered as actual or special damages. This view is re-enforced, if it needs re-enforcement, by the averment that this sum was unnecessarily paid. The court refused to allow exemplary and punitive damages in the absence of aggravating circumstances. It further held that while the breach of contract would entitle the party injured to a nominal damage at least, this principle of law does not apply in a case in which only actual and punitive damages are sued for, the pleadings being most strongly construed against the pleader.

Haber, Blum, Block Hat Co. vs. Southern Bell Teleph. & Teleg. Co. (Ga.), 45 S. E. 696.

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IN THE OPERATING FIELD.

INDIANA CONVENTION AT LAFAYETTE.

(Telegraphed by Special Representative.)

AT the Convention of the Indiana Independent Mutual Telephone Association, held at Lafayette, Ind., on Tuesday and Wednesday of this week, the following officers were elected: Theodore Thorwald, of South Bend, president; C. A. Reeves, of Plymouth, vice-president; J. W. Johnson, of Elkhart, secretary.

The nominating committee was composed of J. G. S. Vandersen, of Michigan City; D. E. Miller, of Flora; Elmer Sweitzer, of Crawfordsville. The president, vice-president and secretary were appointed a legislative committee. C. S. Norton, Indianapolis; H. A. Barnhart, Rochester, and John Bell, of Salem, were appointed a committee to effect a standardization of toll line apparatus. Mr. Thorwald, in his speech, urged a closer cooperation in toll business. At his suggestion the Association empowered the president to appoint a committee of four, beside himself, to arbitrate toll matters.

Many interesting papers were read at the convention, the speakers being Professor J. C. Kelsey, Purdue University, Lafayette, Ind.; Henry A. Barnhart, Rochester, Ind.; S. B. Fowler, Lafayette, Ind.; Hon. John F. McHugh, Lafayette, and others.

To say that the convention was a great success is putting it mildly. The entertainment provided by the Sterling Electric Company and the Chicago Telephone Supply Company as hosts, was among the most elaborate ever accorded an Independent telephone convention. Manufacturers were there in force and the exhibits fairly overflowed the Hotel Lahr.

Among the exhibitors were:

Sterling Electric Co., Lafayette, Ind.
Century Telephone Construction Co., Buffalo, N. Y.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y., and Chicago, Ill.
North Electric Co., Cleveland, Ohio.
International Telephone Mfg. Co., Chicago, Ill.
Chicago Writing Machine Co., Chicago, Ill.
Monarch Telephone Mfg. Co., Chicago, Ill.
Frank B. Cook, Chicago, Ill.
Automatic Electric Co., Chicago, Ill.
National Carbon Co., Cleveland, Ohio.
American Conduit Co., Chicago, Ill.
Miller Anchor Co., Norwalk, Ohio.
Crawfordsville Wire & Nail Co., Crawfordsville, Ind.
Swedish-American Telephone Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
F. Bissell Co., Toledo, Ohio.
Holtzer-Cabot Electric Co., Chicago, Ill.
American Electric Telephone Co., Chicago, Ill.
Central Electric Co., Chicago, Ill.
American Electrical Works, Phillipsdale, R. I.
Gould Storage Battery Co., Chicago, Ill.
Valentine-Clark Co., Chicago, Ill.
Indiana Arm, Bracket & Pin Co., Indianapolis, Ind.
Crouse-Hinds Co., Syracuse, N. Y.

Several other companies were also represented at the convention.

A full report of the convention proceedings, entertainment and manufacturers, together with the papers read, will be printed in THE AMERICAN TELEPHONE JOURNAL'S issue of July 9th.

KANSAS CITY FIRE DEPARTMENT SWITCHBOARD.

WITHIN a few days the new switchboard will be installed at fire headquarters. This board is the property of the city. Up to this time the city has been using a switchboard belonging to the Bell Company, and had to pay an enormous rental, besides the Bell Company would not allow the Home Company to connect its telephones with the board. The new board is to have connections with both companies. It is wired for 120 trunk lines, so there will be plenty of room for direct connections with the larger corporations, who will appreciate this additional opportunity for guarding against a fire loss. The board is arranged in duplex, with places for two operators, so as to allow for any future growth.

BELL TACTICS IN GEORGIA.

AN illustration of Bell tactics as employed in the South, may be of interest to our readers. Some two years ago the Bell company went to Covington, Ga., and tried to bulldose Mr. C. C. Brooks, who owned the telephone system in that town, into the old worn out agreement of renting its telephones, with the usual claims of improved service to be gained thereby. As Mr. Brooks would not accept the proposition, the Bell company built lines and offered reduced rates to get a hold. Some people subscribed to the service, but in general the results were far from encouraging to the Bell interests. Mr. Brooks continued on the even tenor of his way in trying to serve the people with a telephone service that fitted their needs, and now has over 250 subscribers. The Bell company has but 20.

Only a few months ago, the Gainsboro Telephone Company, a sub-licensee of the Bell company, went to McDonough, Ga., and tried similar tactics with the local company there, owned by Mr. H. C. Bridges. Failing in this, it offered to buy the plant at one-third of its original cost. Of course, Mr. Bridges refused to sell, so the Gainsboro company built a system for the express purpose of destroying the business of the local company. Free service was introduced. The citizens, however, are standing by the local company and as it has connection with Atlanta through the Independent lines of the Atlanta Telephone and Telegraph Company, the need for using the Bell lines for toll services is done away with. Mr. Brooks has installed a large number of telephones in the farming district and is steadily increasing his business, notwithstanding the efforts of the Bell opposition.

OWENSBORO HOME COMPANY'S IMPROVEMENTS.

THE Home Telephone Company, of Owensboro (Kentucky), has bought a franchise for a telephone system in the town of Whitesville. The location is a promising one and bids fair to be very remunerative. The Home Company is also engaged in building an exchange in Maceo and in extending the lines of its West Louisville exchange to Delaware and Belch Grove. Extensive additions are also being made by this company to its exchanges at Stanley, Sorgho and Ensor. When these extensions and improvements are completed the Home Company, of Owensboro, will have a plant of exceptional value.

AN ENGLISH TELEPHONE EXHIBIT AT ST. LOUIS.

AMONGST the British exhibits of electrical machinery at St. Louis, will be one made by the Consolidated Electrical Company, of London. This company was one of the pioneers in the telephone industry in England, having been manufacturing apparatus for the past twenty years. The instruments represented are similar to those supplied to the British

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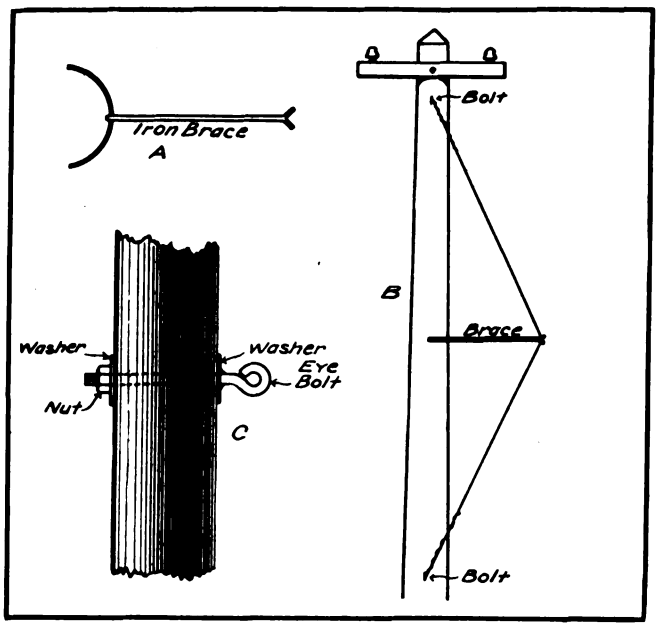
Post Office, War, and Navy Departments, and consist of telephones, switchboards, lightning arresters, feeder and power panels, relays, transmitters, condensers, ante-shock receivers, portable marine apparatus, also specially designed apparatus for railway work, distributing boards, fuse panels, circuit breakers; in fact, almost everything in use in the telephone line, will be on view.

A POLE BRACE.

IT often happens in turning a corner with a line that there is no place where a guy wire can be fastened. As the strain upon the pole is often very great, the method of bracing illustrated herewith may prove of interest. Its method of application is self-evident from the drawing, in which *A* represents the



brace, *C* the bolt to hold the strain wire, and *B* the strain in position. Care should be taken in so placing the bolts for the strain wire that they bisect the angle formed by the two leads. In other words, the angle formed by the strain wire and a lead going in one direction should equal the angle formed by the strain wire and the lead goining in the other direction.

CONEWANGO VALLEY TELEPHONE COMPANY.

AS a result of the efforts of Mr. C. G. Mead, the work of developing the field for an Independent telephone system and the organization of an Independent Home Telephone Company has been completed.

The Conewango Valley Home Telephone Company, recently incorporated under the laws of the State of New York, with a capital stock of $10,000, is one more link in the strong chain of Independent systems.

This company will establish a first-class and thoroughly up-to-date local telephone exchange, with long-distance connections giving continuous service. The territory to be covered is about 25 miles square, through a prosperous farming section including the towns of Cherry Creek, South Dayton, Dayton, Forestville, Hamlet, Leon, Conewango Valley, Balcom, Millville, Cottage, Markhams and Wright's Corners.

This company has already perfected arrangements with the Inter-Ocean Long-Distance Telephone Company, which is building a through trunk line from Jamestown to Buffalo to connect its wires with the local switchboard.

The general headquarters and central office of the company will be located in the post-office building at Cherry Creek, N. Y. Following are board of directors and officers of the company:

Directors—E. B. Crissey, C. H. Lake, Dr. W. J. French, Dr. E. W. Storms, B. C. Wilson, G. W. Rood, H. S. Sweetland, E. B. Dye, A. H. Libby, E. J. Helmick and C. G. Mead.

Officers—Dr. W. J. French, president; G. W. Rood, vice-president; E. J. Helmick, secretary; H. S. Sweatland, treasurer; C. G. Mead, superintendent of construction and general manager.

A NEW OHIO TELEPHONE ASSOCIATION.

INDEPENDENT companies in Clark, Champaign, Miami, Logan, Shelby and Darke counties, Ohio, have perfected an organization to be known as the Miami Valley Telephone Association. This was effected at a meeting held at Piqua, which was presided over by Leo Flesh, of that city. M. B. Oberly, general manager of the United States Company, and J. S. Brailey, Jr., of the Central Construction Company, of Toledo, were present.

These men assured the members of the association that work would be started at once toward the construction of lines which will give every member direct connections with Chicago, Kansas City and several other of the larger western cities. There were 25 individual companies represented at the meeting. A committee was appointed to nominate permanent officers and adjourned to meet again in Piqua on the first of July to effect a permanent organization and elect officers.

Clark County has 2,400 Independent telephones; Champaign County nearly 3,000, and Miami County 4,400. Mr. Brailey, who is the head of the Central Construction Company, has been closely connected with President E. L. Barber, of the Home Telephone Company, of this city, for the last eight years.

A NEW PENNSYLVANIA COMPANY.

IT has developed that the recent sale of the rights and property of the New Jersey and Pennsylvania Telephone Company to J. Davis Brodhead, of South Bethlehem, was made in the interests of a syndicate of business men who will install a most up-to-date system in the towns of Easton and Bethlehem. The parties interested are: Malcolm Campbell, of New York City; W. A. Wilbur, R. M. Gummere, E. P. Wilbur, E. M. McIlvane and J. D. Brodhead, of South Bethlehem; J. W. Fuller, of Catasaqua; M. P. Quinn, of Philadelphia; H. Mutchler, of Easton, and M. Dodson and W. B. Myers, of Bethlehem.

The company will be known as the Easton & Bethlehem Company, and will include the lines of the New Jersey & Pennsylvania Company; the Warren Telephone Company, of New Jersey, and the Easton Telephone Company. Connections will be made with all the Independent telephone lines throughout the Lehigh Valley, and, by means of toll and trunk service, with the systems of the States of Pennsylvania, New Jersey and New York. The system in New Jersey comprises lines in Belvedere, Phillipsburg and Washington. Property has been secured in Bethlehem and Easton for new exchanges. Contracts for the new apparatus were placed some time ago and the equipment for the Bethlehem exchange is being installed.

A GROWING NEW YORK INDEPENDENT COMPANY.

ABOUT nine years ago the Orange County (New York) telephone Company started in business in Middletown. At the present time the local exchange has nearly 900 telephones. A year ago the number of subscribers was 590. The reason for this extraordinary increase is due partially to the exceptionally good service rendered by the company and also to the innumerable places to which one may talk without paying toll.

The Orange County Telephone Company made its first toll and connection with the Farmers' Telephone lines a year ago. At the present date it connects with over 20 exchanges of the Farmers' Union Company in New York and New Jersey, and also has 14 exchanges in its own system to which no toll charges are made. In all, a subscriber to this system can talk to upwards of 2,000 others with no extra charge other than the regular rate. Toll connections are made to lines of the Highland Telephone Company and also with Warwick, Chester, Newburgh, Poughkeepsie, Kingston and Catskill. Within a short while it will be possible to reach Albany over toll lines and that will mean that Orange County Telephone subscribers will be able to talk to Rochester and Buffalo. Through the Farmers' Company connection is made with the independent systems in New Jersey, and through these systems with the toll line companies connecting the principal Independent exchanges in the State of Pennsylvania.

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TELEPHONE PATENTS

AN ELECTROMAGNETIC SIGNAL.

(No. 762,430) granted to F. R. McBerty, of Evanston, and F. H. Loveridge, of Chicago, and assigned to the Western Electric Company. This signal is shown in the accompanying illustration, which consists of two electromagnets, *a* and *a'*, which are secured to a soft iron frame, *c*. These two magnets are separated, and between them there are two armatures, *a2* and *b2*. The armature, *a2*, carries a projection, *d*, which, as is shown in Fig. 2, forms a target in front of the signal. This same armature can also, as is shown in Fig. 2, be arranged to operate a pair of jacks. The two armatures, *a2* and *b2*, are pivoted back to back upon

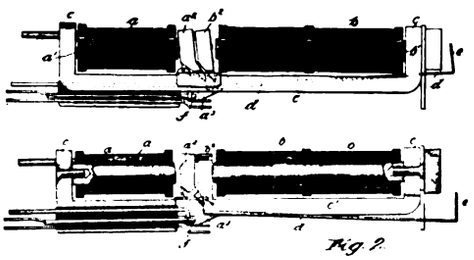

Fig. 2.

knife edges, and in such a manner that when neither magnet is excited the weight of the two armatures is sufficient to hold the armature, *a2*, in the position shown in Fig. 1, in which the target, *e*, is elevated and conceals the signal which is placed behind it. If magnet, *b*, is excited *b2* is drawn forward, then if magnet *a* is unexcited armature *a2* will follow armature *b2*, the target will drop and the signal display. On the contrary, if the magnet, *a*, is simultaneously excited, armature, *a2*, will be retained in its normal position, and no signal will be displayed. Thus it appears that the display of the signal appears upon the mutual excitation of the two magnets.

SWITCHBOARD SIGNAL.

In patent (No. 762,432) which is granted to J. L. McQuarrie, of Chicago, and assigned to the Western Electric Company, the use of the signal which is described in the previous patent is explained, for this patent covers a switchboard circuit which is particularly adapted to the employment of the signal. Of its de-

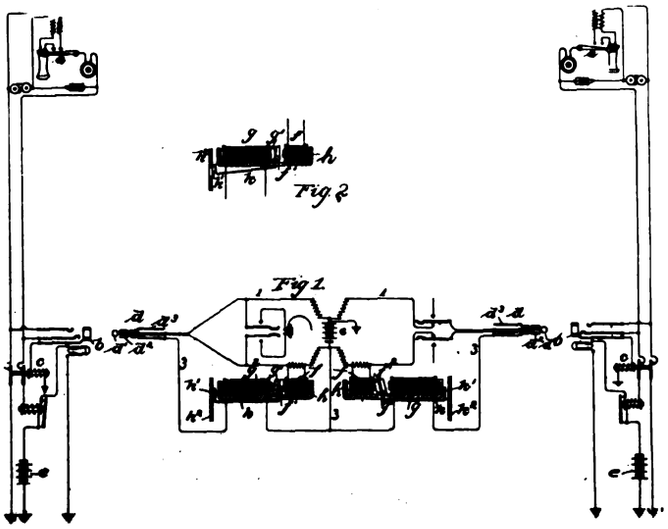

Fig. 2

Fig. 1.

scription in the accompanying illustration a pair of subscriber's stations of the usual description are shown connected to the central office and ending in the jacks, *b*. The usual subscribers' lamp signal, cut off relay, and common battery, *e*, are shown. The novelty of this device lies entirely in the cord circuit in which the signals previously described are indicated. It will be seen that the winding of the magnet, *f*, is included in the conductor, *2*, of the cord circuit, while the magnet, *g*, is included in conductor, *3*, which connects to the ring of the jack and thence to ground. It is thus evident that when the plug is not in any jack neither magnet will be excited and no signal will be displayed. As soon as the plug is inserted into a jack the magnet, *h*, becomes excited, and if then the subscriber's receiver is on the hook, the magnet, *f*, will not be excited and under these circumstances, as shown in the previous patent, the target will drop and a signal be displayed, whereas if the subscriber's receiver be off the hook, current will flow through winding *f*, armature *f'* will be retracted and no signal will be displayed. The object of the signal described in the previous patent is thus made evident.

TELEPHONE SELECTING DEVICE.

W. M. James, New Brighton, Minn., patents (No. 761,888) a selective signalling device. This invention falls into the category of step by step mechanisms. At each substation a revolving disc is provided in which a number of holes are drilled. This disc is operated by an escapement controlled by an electromagnet. Each impulse sent over the line causes the disc to revolve one notch and thereby enables any station to be selective.

IMPROVED TELEPHONE RELAY.

F. R. McBerty, Evanston, Ill., patents (No. 762,338) an improved telephone relay. This relay is shown in the accompanying illustration in Figs. 1 to 3, inclusive, the object being to secure a relay which can be economically manufactured so designed as to be made into banks that may be readily placed in a telephone exchange. The general features are shown in Fig. 3.

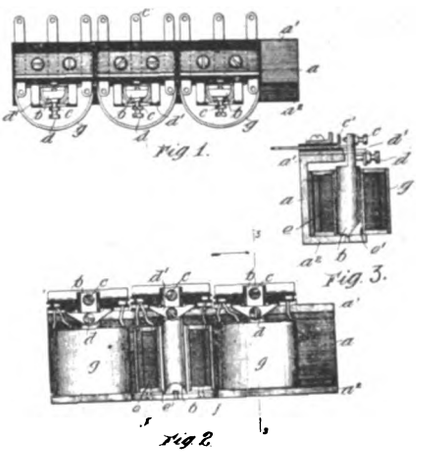

Fig. 1.

Fig. 3.

Fig. 2.

A is a channel-shaped piece of iron which carries a pivoted armature *b*. The exciting coil of the relay is shown at *e* placed around the armature and bolted to the channel piece *a*. The channel piece also carries contacts *c* and *c'*.. This device with a number of coils and armatures may be mounted one after the other inside of the channel line, which forms a common magnetic circuit and lends itself readily to placing the relays in banks.

CONNECTION COUNTER FOR TELEPHONE EXCHANGES.

C. E. Scribner, of Jericho, Vt., is granted a reissue, 12,232, of patent (No. 680,890), covering an improved counter for telephone exchanges. This reissue covers certain improvements in one of Mr. Scribner's early patents upon telephone exchange counters. The essential features consist in an escapement mechanism to operate a dial that indicates the number of messages which a substation sends. This mechanism is operated in conjunction with a relay so arranged that only when the called subscriber responds the counter device is actuated and at other times is magnetically locked.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

CHARGINC CIRCUIT.—(363.)

Will you please explain how it is that battery can be fed on one side of a telephone circuit to charge a storage battery for a branch exchange.
C. T. P.

By referring to the diaphragm, Fig. 363, it will be seen that the line side which includes the line relay is connected to ground instead of to battery, as is usual, and that the mate side goes to battery instead of to ground. In this way it is possible to supply battery over the mate side. The reason why this method of connection is not always used is because the line signal acts as a guard upon the circuit, so that if it becomes grounded or shunted the signal will show up, whereas the circuit as illustrated could be grounded or shunted without any indication of the trouble other than a fuse blowing if the flow of current is excessive.

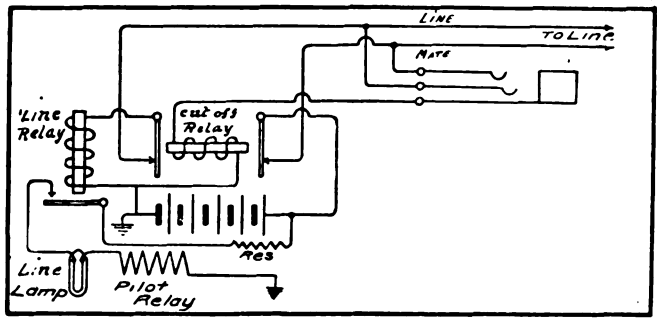

Fig. 363.

BOOKS ON INDUCTION COILS.—(364.)

Please give me further explanation of books on induction coils, and relative advantages of both (Norrie's and Bonney's). I want to make a coil capable of giving spark through from two to three and a half inches for wireless telegraphy and other experimental use. S. W. M.

It would be difficult for us to institute any comparison upon the two books upon induction coils which you mention, because both volumes are well written and contain much information. We infer from your query that you desire instructions for making a coil of a definite size, but we regret to say that we do not know of any volume which will give you exact information of this kind.

BOOKS ON INDUCTION COILS.—(364.)

We intend to build some new lines, and would like to know how many poles to use per mile that will make a well constructed line. Also, what size cross arms should be used, and the size of wire. One of the lines will be about 40 miles in length, the rest between 7 and 30 miles long. N. T. Co.

Not knowing the condition of the country through which you intend to build your lines, we can only give you approximate figures. Poles should average 33 to the mile for iron and 40 for copper. For single cross-arm lines they should be not less than 25 feet in length and have a circumference at the top of not less than 13 inches, and at six feet from the butt, 25 inches. It is economical to use tenpin arms where you will run three or more pairs of wires. The arms should be 8 feet long and have a cross section of 3¼" x 4¼".

Wire for circuits up to 12 miles should be No. 12 iron or No. 14 copper; for distances up to 50 miles, No. 9 iron or No. 12 copper.

LARGE OUTPUT GENERATOR.—(366.)

Will you please tell me what would be the best and most economical generator to use? We have a switchboard of 100 drops and country lines. The furthest we ring is sixteen miles. Have eight circuits and building more line. We have as many as twenty-two on one line. R. L.

From the outline of your system, that you have given, we believe that a six bar generator of good quality would be satisfactory for your work. It is necessary that it should be a good quality generator because, if not, the output of the armature will not be sufficient to operate all the bells, especially when you have such a large number as 22.

If you have water power at hand it would be economical, we think, to put in a water motor of about ⅛ horse-power and belt it to a large output generator. What is needed in your case is voltage and amperage. If you only had to ring two bells a distance of 16 miles you would require voltage the same as you do to ring 22 bells, but the amperage could be much lower than is necessary to ring the 22 bells.

DIFFERENCE IN CELLS.—(367.)

Is there any difference between the current of dry and wet cells? In operating a fan motor I find a dry cell lasts much longer than a wet cell. What is the cause? O. A. H.

There is no difference in the current of the two cells, excepting the output. A dry cell when new has a potential of about 1.4 volts and on a short circuit will give from 9 to 15 amperes, according to the area of the zinc and the size of the cell. A wet cell has an electromotive force of between 1.3 and 1.5 volts and a current output upon a short circuit from 7 to 20 amperes, according to the size of the zinc electrode.

In operation the wet cell becomes polarized very quickly, especially if the resistance it is working through is low, and consequently the electromotive force drops off to less than 1 volt, and of course the amperage is considerably lowered, too. A dry cell on account of its composition resists the polarizing effect to a much greater extent, consequently maintains its voltage and current output for a much longer period of time.

In all probability the resistance of your battery motor is very low, and the reasons we have stated above are the causes for the dry cell running the motor for a greater length of time than is found possible with the wet cell.

BELL FOUR PARTY INSTRUMENT.—(368.)

Please explain the connections of the Bell four-party magneto instruments.
L. I.

The bell connections are shown in Fig. 368. *C*, *D* and *E* are three binding posts within the bell box, and *a* and *b* are two flexible connectors. By means of these connections it is possible to so arrange the bell with reference to the polarity of the ringing current and the bias spring *s* as not to operate except under the proper conditions. The four connections possible are: (1) *a* to *C*, *b* to *D*; (2) *A* to *D*, *B* to *C*; (3) *A* to *D*, *b* to *E*, and (4) *a* to *E*, *b* to *D*. By means of ringing keys at the exchange, it is possible to send either positive or negative pulsating current over either side of the line at will.

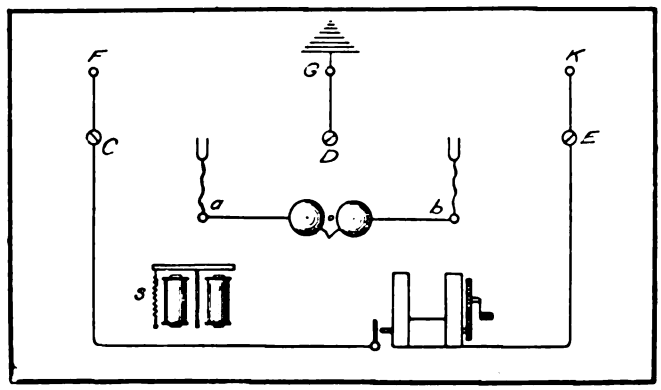

Fig. 368.

The generator at the sub-station generally has only two magnets. This is because in signaling the large output of current would ring the bells of the other stations.

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THE WEEK'S MESSAGES

FINANCIAL.

LOS ANGELES, CAL.—A meeting of stockholders of the San Fernando Valley Home Telephone Company has been called for August 11th, 1904, for the purpose of voting on a proposition to create a bonded indebtedness of that corporation in the amount of $40,000, with interest at 5 per cent. per annum.

CHAMPAIGN, ILL.—The Home Telephone Company, of Champaign, has increased its capital stock from $25,000 to $100,000.

TUSCOLA, ILL.—The Tuscola Telephone Company has increased its capital stock from $5,000 to $10,000.

BOSTON, MASS.—The directors of the American Telephone & Telegraph Company have declared the regular quarterly dividend of 1½ per cent. and ¼ of one per cent. extra, payable July 15, to stock of record June 30. The company's books will close July 1 and reopen July 15.

WESTMINSTER, O.—The United Farmers' Telephone Company, of this town, has increased its capital stock from $10,000 to $20,000.

CAROLINE, WIS.—The Farmers' Independent Telephone Association, of Caroline, has increased its capital stock from $1,000 to $2,500.

FRANCHISES.

MENDOCINO, CAL.—John McClish has petitioned the board of supervisors of Sonoma county for a 25-year franchise to construct, operate and maintain a telephone system in that county.

MUNCIE, IND.—The Delaware & Madison Counties Telephone Company has secured a franchise admitting it to all towns in Madison County. Work on an exchange in Frankton has been begun.

COUNCIL BLUFFS, IA.—A meeting of citizens interested in the project for an Independent telephone exchange in Council Bluffs, held a meeting recently to draft articles of incorporation, and a franchise ordinance to be presented to the city council.

HANCOCK, MICH.—C. L. Wright appeared before the city council recently in behalf of the Automatic Telephone Company, requesting the council to grant his company permission to construct a telephone system in this city.

HASTINGS, NEB.—The Hastings Independent Telephone Company has asked the city council for a franchise. The company agrees to lay all wires underground and to have 400 telephones in operation before charging for service.

MIDDLETOWN, O.—The Middletown Telephone Company has brought suit in the probate court, through its attorneys, Charles H. Bostler and Albert Emanuel, against the city of Middletown to secure the right to construct, maintain and operate a telephone system in this city.

WAYNE, PA.—F. A. Wunder, representing the Keystone Telephone Company, of Philadelphia, appeared before the commissioners of Lower Merrian township to ask for a franchise.

WATERTOWN, S. D.—The Dakota Central Telephone Company has been granted a 20-year franchise by the city council to operate a local telephone exchange. The wires in the business part of the city will be laid in conduits.

MONROE, WASH.—The newly organized Tualco Telephone Company has applied to the county commissioners for a franchise to construct a line from Monroe to Cherry Valley.

ELECTIONS.

GRANVILLE, ILL.—The Granville Telephone Company has elected W. B. Sill, president; A. D. Fisher, vice-president; B. B. Blosser, secretary, and W. P. Magee, treasurer. C. M. Chase, John Kunkle, W. E. Hawthorne, C. W. Dysart and Olaf Matson, directors.

TERRE HAUTE, IND.—The Citizens' Telephone Company has elected the following officers: W. P. Ijams, president; Fred B. Smith, vice-president; C. R. Duffin, secretary, and G. A. Conzman, treasurer.

STORY CITY, IA.—The Story City Telephone Company has elected A. M. Henderson, president; J. E. Cagwin, vice-president; T. T. Henryson, secretary; P. C. Christianson, treasurer. J. E. Cagwin, A. M. Henderson, M. Henderson, Joseph Marvick and E. L. Erickson, directors.

ST. PETER, MINN.—At the annual meeting of the Nicollett County Telephone Company, the following officers were elected: M. P. Quist, president; C. Samuelson, vice-president; C. C. Nelson, secretary and manager, and P. A. Retrum, treasurer.

VIBORG, S. D.—E. C. Nelson has been elected secretary of the Viborg and Center Point Telephone Company.

LA CROSSE, WIS.—The following officers have been elected by the board of directors of the La Crosse Telephone Company: President, I. H. Moulton; vice-president, W. W. Gargill; secretary and treasurer, W. F. Goodrich.

COMBINATIONS.

LANESBORO, IA.—The Lanesboro Mutual Telephone Company has purchased the local system operated by J. V. McCoy.

SUMNER, IA.—Fred Pieggenkuhle, residing near Hockeye, has purchased the property of the Sumner Telephone Company for $7,100. A new line will be put in to West Gate, Maynard and Randalia. Many other improvements are contemplated.

MOUNT CALM, TEX.—Z. R. Young has sold the Mount Calm Telephone exchange to E. T. Nickels.

PERSONAL.

S. P. GRACE, chief engineer of the Central District and Printing Telegraph Company, of Pittsburg, has had the honorary degree of "Master of Engineering" conferred upon him by the State University of Michigan.

F. W. HEIDEL has been appointed manager of the Central New York Telephone Company.

UNDERGROUND.

ST. PAUL, MINN.—The Northwestern Telephone Company has been authorized to place its wires in certain streets in underground conduits.

BLOOMINGTON, ILL.—The Home Telephone Company has just completed the stretching of a new underground cable on Jefferson street, between Main and Madison streets, to accommodate new service in the business district.

MISCELLANEOUS.

LAKE CITY, MINN.—The Northwestern Telephone Company has removed its officers to a larger building on account of the growth in business, and will institute a night service.

JERICO, MO.—The Jerico Telephone Company lost its central office by fire last week. They expect to rebuild at once.

NEW COMPANY NOTES

SANTA ROSA, CAL.—The Westside Telephone Company, of Healdsburg, has been incorporated by J. McLish, M. V. Frost, and others.

CIRCLEVILLE, IND.—The Circleville Telephone Company has been incorporated here with a capital of $5,000.

URBANA, IND.—The Urbana Independent Telephone Company has been incorporated with a capital stock of $10,000, and will build an exchange in Urbana, Wabash county. Adam Cook, E. F. Baker and Emanuel Stover, directors.

VEVAY, IND.—The Farmers' Mutual Telephone Company has been incorporated here with a capital of $6,000, to construct and operate telephone lines in Switzerland county.

WILMOTT, IND.—The Wilmott Mutual Telephone Company has been incorporated with a capital stock of $10,000. An exchange will be built in Wilmott, and the lines extended in Whitley county. The chief incorporators are F. E. Baker, Emanuel Staver and Adam Cook.

HOLSTEIN, IA.—The Cushing Telephone Company has been incorporated with an authorized capital stock of $9,000. The officers are: President, H. H. Lunud; vice-president, James Holcomb; secretary-treasurer, W. F. Hutton.

WELDON, IA.—The Smyrna and Weldon Telephone Company has incorporated with a capital stock of $250, with the power to increase the capital to $500. The following directors were elected: W. N. Hall, T. B. Jamison, Geo. A. Beattie, Arthur Hoover and John Cannon.

GODDARD, KANS.—The Goddard Telephone Company has been incorporated here with a capital stock of $2,500. The officers are: W. D. Strong, president; H. C. Sinbur, vice-president; L. T. Smith, secretary, and W. H. Dwight, treasurer.

HOME CITY, KANS.—The Home City Telephone Company has been incorporated with a capital stock of $2,100, and work is to begin at once.

CAMBRIDGE, ME.—The Cambridge Telephone Company has been incorporated with a capital stock of $10,000, to give telephone service in this vicinity. The officers are: T. J. Hersey, president, and D. F. Clark, treasurer, both of Cambridge.

NEW SWEDEN, MINN.—The Farmers' Co-operative Telephone Company has been incorporated with a capital of $12,000. The officers are: J. H. Nutter, president, and E. B. Rounsville, secretary.

SHAKOPEE, MINN.—The Shakopee Telephone Company nas been incorporated here by J. B. Ries and others.

WOODBURY, N. J.—The People's Rural Telephone Company has contracted with the Eastern Company for long distance calls. Nearly every farmer in the county is a subscriber. The central station will be in Wenonah.

PRATT CITY, O.—The People's Telephone Company is extending its lines to Sandusky. The company is also making extensive improvements in its service in this city. During the last month thirty new subscribers have been added, making a total now of ever 150.

BAY CITY, TEX.—The Bay City and Matagorda Telephone Company has been incorporated with a capital of $5,000. The incorporators are: W. W. Boulder and R. H. Taylor, of Bay City, and A. W. McNabb, of Matagorda.

BEN WHEELER, TEX.—The Central Telephone Company has been incorporated with a capital of $5,000, by W. J. Steward, A. J. Adboni and J. A. Reynolds. They will construct and operate an exchange here.

UNION BLUFF, TEX.—The Union Bluff Telephone Company has been incorporated by G. H. Garrett, H. Daniell, H. D. Bookout and R. T. Bookout, and will begin construction at once.

WAXAHATCHIE, TEX.—The Mutual Telephone Company has been incorporated with a capital stock of $50,000, to construct and operate lines in Ellis, Dallas, Kaufman, Hill, Navarro, Johnson and Tarrant counties. The incorporators are: John M. Harrison, of Waxahatchie; P. M. Wheatley, of Weatherley; W. A. Lewis, of Howard; W. A. Culbertson, of Sterrett; J. B. Wiley, of Ovilla.

CONSTRUCTION.

LAYTONVILLE, CAL.—The Pacific Telephone Company, of Mendocino county, with lines from Covelo to West Port and from Laytonville to Cahto, has decided to extend its system from Laytonville to Sherwood. The officers of the company are W. S. Pinches, W. F. Wade, and C. Ira Brown. It has a capital stock of $25,000.

ST. JOHNS, N. B., CAN.—The Penfield and St. George Telephone Company is making extensive improvements, and will connect with Deer Island, Eastport and Campobello.

COLORADO SPRINGS, COLO.—The Colorado and Midland Railway Company has equipped its line with a telephone system.

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MANCHESTER, ENG.—A corporation of Manchester will install a municipal telephone system in co-operation with a dozen neighboring towns.

EUSTIS, FLA.—Henry W. Bishop is arranging for the construction of telephone service to Lake county. The city council recently gave him a 20-year concession with liberal privileges.

CHICAGO, ILL.—The management of the Illinois Central Railroad Company is considering plans for the expenditure of about $400,000 for rebuilding and re-equipping its telephone system. The present system, which has cost the company a large amount of money, has been found to be inefficient for distances of over 400 miles. The wire weighs about 175 pounds to the mile, whereas experiments have shown that wire weighing more than 400 pounds must be used.

WASHINGTON, ILL.—The Washington City Rural Telephone Company is installing 1,000 feet of new aerial cable to accommodate the growing needs of the service.

WATSEKA, ILL.—The Watseka Home Telephone Company will extend its line to Crescent City and Pitwood.

ATLANTA, IND.—Warner Goodykoontz, who operates the Atlanta Telephone plant, proposes to extend the Atlanta line to Tipton, Ind.

BLOOMINGTON, IND.—The new Bloomington Telephone Company has decided to expend $25,000 in improving the local system. The old poles will be replaced with larger ones, so as to place the wires above the electric light wires.

BRAZIL, IND.—The Citizens' Telephone Company has extended its lines to Lewis.

GOSHEN, IND.—The Elkhart Home Telephone Company will expend $6,000 in new cables in Goshen and additional switchboards for both Goshen and Elkhart.

KIRKLIN, IND.—D. L. Thompson is preparing to rebuild the telephone lines in Kirklin. The system now has over 270 telephones.

MUNCIE, IND.—The Mt. Pleasant Telephone Company has practically completed its construction. The company has about 100 farm lines and half as many city lines, and will have two direct trunk lines connecting this city with Medford, Ind.

ODEBOLT, IA.—The state board of control has let the contract for a new telephone system for the State hospital at Cherokee to the New State Telephone and Telegraph Company, of Odebolt.

SHELL ROCK, IA.—The Shell Rock Telephone Company is rapidly extending its system on account of demand for service by farmers in this vicinity.

BELOIT, KANS.—The Solomon Valley Telephone Company is contemplating purchasing a new magneto switchboard, so arranged that it can be changed to central battery board.

ELDORA, KANS.—The Eldora Mutual Telephone Company is about to spend $2,350 on improvements.

HARRIS, KANS.—The Harris Telephone Company will begin the construction of its toll line to Garnett, Kans., at an early date.

IOLA, KANS.—Mr. C. J. Peterson, of Iola, has been promoting a farmer telephone company at Elsmore. He will begin construction work at once.

LOUISBURG, KANS.—The Farmers' Mutual Telephone Company, of Louisburg, will build toll lines to West Line and Cleveland, Mo., this summer.

MOUND CITY, KANS.—The Mound City Telephone Company will build to Kincaid, Kans., in the near future.

NORTON, KANS.—Joseph H. Young, manager of the Central States Telephone Company, has been several days in Kansas City, Mo., looking over the plant of the Home Telephone Company.

WILLIAMSBURG, KANS.—Mart Getchell, of the Williamsburg Telephone exchange, reports that the farmer lines business is very heavy this spring and expects to extend several new lines during the summer.

MAYSVILLE, KY.—The Maysville Telephone Company is extending its toll line connections in every direction.

BREAUX BRIDGE, LA.—Citizens of this place are arranging to organize an Independent telephone company, to construct and operate an exchange in this town and toll lines to St. Martinville and other points. The town council will be petitioned at once to grant a franchise.

BLAINE, ME.—The Farmers' Telephone Company is still extending its line, and is putting in many new instruments. The line extends into New Brunswick, and will also be built to Houlton and Presque, Maine.

PORTLAND, ME.—The Northeastern Telephone Company has made arrangements to install a secret service telephone system in the general offices of the Grand Trunk Railway.

LEONARDTOWN, MD.—J. F. Coad, of Leonardtown, J. Canter, of the South Maryland Telephone Company, have announced that the line from Mechanicsville to Leonardtown would run to Laurel Grove and Morganza. Mr. Coad states that orders will at once be given for the construction of the line, and actual work will be commenced as soon as he can buy poles.

BALDWINSVILLE, MASS.—The Templeton Street Railway Company will install a telephone system along the line.

ANN ARBOR, MICH.—The Co-operative Telephone Company, which recently opened its new Ann Arbor line, is doing some very fine business. Nearly 1,000 lines have been placed in the northern section of the city, and the big switchboard is being put into shape to take care of the additional business.

YPSILANTI, MICH.—The Washtenaw Home Telephone Company is installing an exchange in the city. Work is in progress stringing wires, and toll stations have been placed in the two leading hotels.

HECTOR, MINN.—The Social Telephone Company will extend its line to Britton, via Newark, Havana and Kidder.

WILLMAR, MINN.—The Tri-State Telephone Company is building a first-class three circuit copper toll line from the Twin cities to Grand Forks, via Willmar.

KANSAS CITY, MO.—It is planned to run an Independent telephone line along the right-of-way which the Standard Oil Company is buying for its pipe line from the Kansas oil fields to the refinery here. This line will connect with the Kansas City Home Telephone Company.

AINSWORTH, NEB.—The Keyapahupa and Brown County Telephone Company will build a new metallic circuit to connect with other towns in the vicinity.

NELSON, NEB.—The shipment of material for the Nuckolls County Telephone Company has arrived, and work will be pushed on the construction.

SYRACUSE, NEB.—The Farmers' Telephone Line, northwest of town, is making arrangements to construct its lines to Syracuse and connect with the Independent telephone system. Farmers north of town have about decided to take a similar step.

NEWPORT, N. H.—E. B. Hayward and others are soliciting subscribers to an Independent telephone system here.

PRINCETON, N. J.—The Interstate long distance telephone company is now stringing several wires from Trenton to Princeton. A great improvement in the service of the local telephones in Princeton is now being made.

ALBANY, N. Y.—The recently organized Home Telephone Company has commenced work on its plant and expects to be ready for operation before the beginning of August.

ALEXANDER, N. Y.—The Darien and Alexander Telephone Company has extended its line on account of the increased number of subscribers.

COHOES, N. Y.—The Home Telephone Company will move its exchange to larger quarters on account of extensive business, and will build new lines to Crescent, Colonie and Mechanicville.

AUSTINBURG, O.—A local telephone company has been organized here, and will build lines into the country districts in all directions.

COLUMBUS, O.—The Citizens' Telephone Company will install a new switchboard as soon as its new building is completed. It is expected to have, by January 1st, upwards of 8,000 subscribers.

EASTON, PA.—The old New Jersey and Pennsylvania Telephone Company will be reorganized under the name of the Easton and Bethlehem Telephone Company, with headquarters in the two towns. The lines will be improved. The reorganizers are: Malcolm Campbell, of New York; Warren A. Wilbur and J. Davis Brodhead, of South Bethlehem; W. B. Meyers, of Bethlehem; James W. Fuller, of Catasaqua; Martha P. Quinn, of Philadelphia; Charles M. Dodson, of Bethlehem; R. M. Gummere and E. P. Wilbur, of South Bethlehem, and E. M. McIlvaine and Howard Mutchler, of Easton.

ERIE, PA.—The directors of the Mutual Telephone Company have voted to increase the switchboard facilities from 2,000 to 3,000 lines.

HOMESTEAD, PA.—The Pittsburg and Allegheny Telephone Company will install a central energy system within the next thirty days.

MEADVILLE, PA.—The Meadville Telephone Company is installing a switchboard at Conneaut Lake, and has extended the Harmonsburg line to that Exchange.

BUCHANAN, VA.—O. E. Obershain will probably be given the contract to construct a telephone line connecting Big Island with Bedford City.

WHEELING, W. VA.—The Baltimore & Ohio Railway Company are installing a telephone system in their offices in this vicinity, and is connecting with all of the heads of departments from Holloway to Benwood and this city.

JANESVILLE, WIS.—The directors of the Rock County Telephone Company have ordered many improvements in the country districts near Janesville. A three mile extension will be made towards Johnstown. Extensions will be made to the La Prairie line.

KENOSHA, WIS.—The Wisconsin Telephone Company will expend $500,000 in improving its line during the summer.

WHITE BEAR, MINN.—The Twin City Telephone Company has completed its system in this city, and has now 125 subscribers and trunk connection with St. Paul, Minneapolis and all other points reached by this company. The system installed was common battery.

SHELDON, MO.—The Sheldon Telephone Company, which is constructing a system here, will have to make large extensions on account of the number of new subscribers secured.

ALBANY, N. Y.—The Rensselaer County Telephone Company will extend its system to the city of Rensselaer in the near future.

CHARLOTTE, N. Y.—The Charlotte Telephone Company is building a system here that will connect with the Inter-Ocean Company's lines. Connection will also be made with Rochester through the Rochester Telephone Company's exchange.

MARCY, N. Y.—Work on the Marcy exchange of the Utica Home Telephone Company's system is nearing completion. It is expected to have over 100 subscribers for a start.

PLATTSBURG, N. Y.—The Clinton Telephone Company, which was granted a franchise in this town last year, will commence the construction of its plant at once. The franchise granted this company requires that its lines shall be run underground in the business section, the conduit to be built by the company and one duct to be reserved for the use of city wires.

UTICA, N. Y.—The Home Telephone Company has found it necessary to increase the capacity of its system, on account of the large number of new subscribers secured.

ADDISON, N. D.—Richard Piper, president of the Rural Telephone Company, is making arrangements for the extension of the lines from Lynchburg to Addison and Davenport.

CALDWELL, OHIO.—A. N. Dowling, representing the Caldwell Independent Telephone Company, was at Lowell recently, making arrangements for the construction of lines to that place and the probable installation of a switchboard there.

CAMDEN, OHIO—The Camden Telephone Company is rapidly extending its system. New lines are being built in all directions and it is hoped that it will be possible to connect with the lines of the Home Telephone Company at Hamilton within a short while.

OIL CITY, PA.—W. S. Paca, president of the Petroleum Telephone Company, states that the company will make extension of the lines from Hydetown to Titusville, Townville and Guy's Mills. The Meadville Telephone Company, of Meadville, will construct an extension to Guy's Mills, giving through connection from Oil City to Meadville.

RIDGEWAY, PA.—Tri-County Telephone Company connects with Elk Telephone and Telegraph Company, of St. Marys, with Simmerville Company's lines at Du Bois, Armstrong, Jefferson, Clearfield and Clarion counties; with lines of the Union Telephone Company, Pittsburg to Erie.

BERESFORD, S. D.—Work has commenced on the new telephone line which will connect Beresford with the farming region southwest of this city.

BRYAN, TEX.—E. L. Palmer and J. Kyle have built a telephone line at Rogers Prairie to connect with the system in the town.

NEOLA, TEX.—Dr. O. A. Armstrong, Frank Baird, L. M. Vickers, Alfred Woods, the Rev. S. L. Crosson and John Hayter, of this place, will construct a telephone line from Neola to Greenville and install a local switchboard.

SHERMAN, TEX.—The directors of the Grayson County Telephone Company have ratified the sale of six miles of their lines between Dennison and Red River to the Pioneer Telephone and Telegraph Company. At the meeting it was announced that the new line between Sherman and Texarkana would be built at once.

VERNAL, UTAH—The Vernal & Fort Duchuesne Telephone Company has decided to extend its lines to Jensen.

CHEHALIS, WASH.—The telephone line of the Home Telephone Company, of Silver Creek, has now reached this town. The line extends into the country thirty-five miles and is the longest rural telephone circuit in operation in western Washington.

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TRADE NOTES

The Sterling Electric Company, Lafayette, Ind., has just finished sending out a complete folder describing its various protective apparatus. This folder will be sent to any one for the asking.

The F. Bissell Company, of Toledo, Ohio, reports unusually large sales of its Marline cable hangers. The company finds it difficult to keep ahead of the demand, although working an extra force of men in its factory.

The H. H. Franklin Mfg. Company, of Syracuse, N. Y., has issued an attractive booklet entitled "The Cast of a Die," which illustrates in a forceful manner the adaptability of its process of die casting for intricate mechanical parts. This company also wishes to call the attention of the trade to the fact that no other concern is licensed to sell "finished castings" under its processes or patents.

The Central Telephone and Electric Company, of St. Louis, Mo., has purchased the buildings formerly occupied by the Missouri Medical College. The buildings have a frontage of 83 feet on Lucas avenue, and a depth of 145 feet on Twenty-second street. The lot is located in the factory district, and on account of the substantial character of the buildings is considered a very desirable property. The company will use the buildings for a factory and store room.

The Connecticut Telephone and Electric Company, of Meriden, Conn., has just issued its new catalogue No. 8. This issue is most complete, covering exchange apparatus and also a large line of interior telephone systems. The Connecticut Company has as large a line of apparatus as any other telephone company, and it is manufacturing all parts from the raw material in its own factory. A copy of the new and enlarged catalogue will be mailed on request, also the various bulletins.

Mr. Frank B. Cook has recently returned from a trip to the Black Hills, where he has been looking after his interests in the Deadwood Home Telephone Company, which he owns. He reports the Company in a flourishing condition and says that it is rapidly passing its Bell rival in the competition for subscribers. Mr. Cook returned by way of Omaha, Council Bluffs, and Des Moines, where he called on the trade.

The International Telephone Manufacturing Company, of Chicago, reports an increasing demand for its never failing self-restoring drop switchboard, and also for its various types of telephones, including the four-party selective equipment. Among recent installations made by this company in Indiana might be mentioned switchboards and equipment for the Daleville Telephone Company, Summitville Telephone Company, Medford Home Telephone Company, and Frankton Telephone Company. These exchanges are equipped throughout with International express type or mechanical self-restoring drop switchboards, International series exchange and four-party line selective telephones.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Savings & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

FREE Sample to Agent. Practical ready call device for telephones. Saves brain work and hours of time. Sells itself. One sale sells dozens. Seeing is believing. Send stamp. The Telephone Appliance Co., One Madison Avenue, Dept. A. T. J., New York City. 193

FOR SALE—Switchboards and Telephones, all capacities and makes, Terminals, Cross-connecting Racks, Cable, &c., at less than half cost of new. Guaranteed reliable and efficient. Chicago Telephone Apparatus Exchange, 17 S. Elizabeth St., Chicago, Ill. 184

FOR SALE—Controlling interest in telephone company. Incorporated for $5,000. Good, new plant. Good town. For full particulars write. GEORGE CRESS & CO., Effingham, Kas. 200

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by American Telephone Journal.
GILDART BROS., Albion, Mich. 168

WANTED—By man and wife, exchange of 50 to 100 telephones. Have had about six years' experience. Wages right. References furnished. Address, Box 199, American Telephone Journal, 116 Nassau street, New York City. 199

SUCCESSFUL and experienced telephone man desires position as manager of Independent plant in the South or West. At present manager of 500-line common battery plant with extensive toll line connections, but desires to leave as his company has been duped into a Bell sub-license arrangement that is objectionable to him. Thirty years old; temperate. Best recommendations from present and former employers. Address, Box 191, American Telephone Journal, 116 Nassau St., New York City. 191

POSITION WANTED as manager or superintendent of an Independent telephone company by man with four years' experience with Bell companies. Would lease an exchange or operate it for part of the profits. Best of references given. Address Box 197, American Telephone Journal, 116 Nassau street, New York. 197

WANTED—Telephone engineer that is an A1 draughtsman, with ability to handle men, and is familiar with cable work and outside construction. Address, Box 202, American Telephone Journal, 116 Nassau street, New York City. 202

POSITION wanted by a practical telephone man as superintendent of a telephone system or as a salesman on the road. Experienced in all branches of operation. Address Box 195, The American Telephone Journal, 116 Nassau St., N. Y. City. 195

POSITION wanted as superintendent or manager. Thoroughly experienced in magneto and common battery systems. Also with selective party line signaling. Have had charge of right-of-way department for the past two years in a district of five thousand subscribers. Experience gained with Bell company in the East. Address, Box 194, American Telephone Journal, 116 Nassau Street, New York City. 194

WANTED—Second-hand Telephone Apparatus, Central Energy and Magneto Switchboards, Telephones, Bridging Bells, Transmitters, Terminals, Cross-connecting and Distributing Racks, Ringing Generators. State details, price, condition and make. C. E. W., 17 S. Elizabeth St., Chicago, Ill. 188

POSITION WANTED—An up-to-date telephone man, with best of reference as to ability and character, would like position in good Southwest town. At liberty August 1st. Address, P. O. Box 340, Cedar Rapids, Ia. 192

WANTED—Manager for a telephone plant of 1,500 subscribers. Must have a knowledge of the telephone business, not afraid of work, and have an affable manner in dealing with subscribers and meeting the public. Address, Box 201, American Telephone Journal, 116 Nassau street, New York City. 201

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ONE OF OUR GOOD POINTS

is the care we take about tracing Pole Shipments. We aim to keep our finger on every car we load, from the time it leaves our yard, to the time it enters yours. Hadn't you better get our Prices before you order that next car?

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ESCANABA, MICHIGAN.

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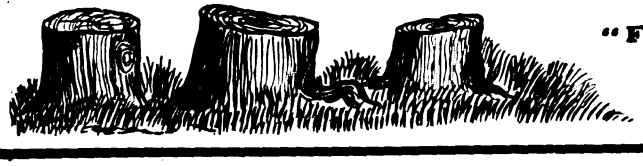
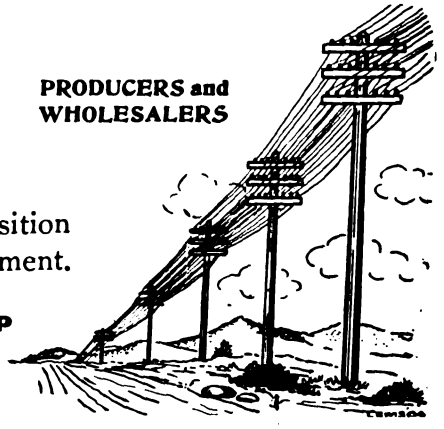
WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



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From 16 Feet to 70 Feet

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Producers and Wholesalers of White Cedar Products

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ELMORE-FOWLER-JACOBS CO.

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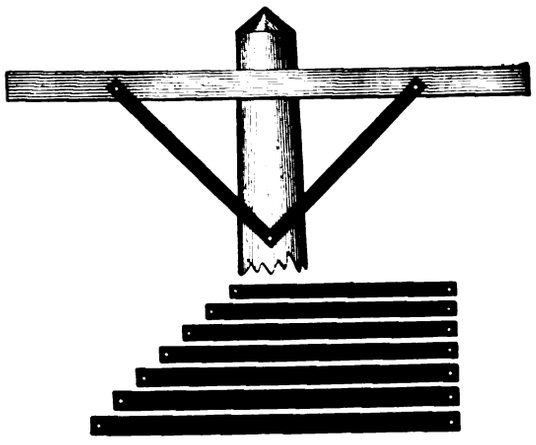

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All Sizes — Quick Shipment

Plain and Galvanized

INLAND STEEL COMPANY

FIRST NAT'L BANK BLDG. CHICAGO

RIGHT IS MIGHT!

OUR POLES ARE RIGHT

We know as much about Telephone Poles as anyone can. We know how to give prompt attention to your business and to secure prompt deliveries by railroad.

A letter from you asking prices or other information will have the same prompt and courteous consideration that we would give an order for 100 carloads of poles.

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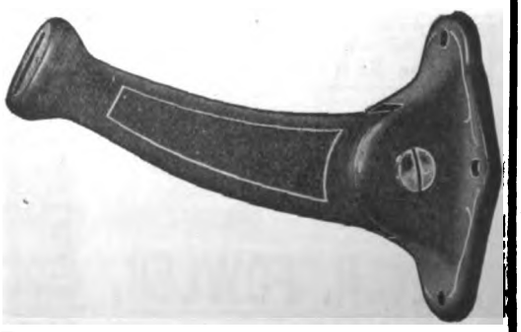
PACIFIC COAST POLE CO.

SPOKANE, WASH.

WE HELP TO MAKE

A Good Telephone



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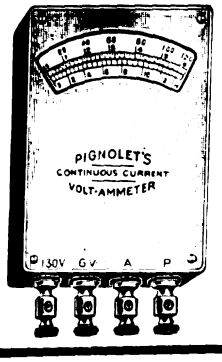
You Will Find It Pays To Test



your lines periodically for insulation and resistance, This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone work and are low in price.

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Originator of the Voltmeter Habit.

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ATTORNEYS.
Munk, Otto, New York City.

BATTERIES.
Electric Appliance Co., Chicago, Ill.
National Battery Co., N. Y. City.
Rungesser Electric Battery Co., Cleveland, O.
Roche, Wm., New York.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

BLANKS, BOOKS AND FORMS.
Telephone Printing Co., Defiance, Ohio.

BONDS.
J. W. Middleton & Co., Chicago, Ill.

BRASS.
Benedict & Burnham Brass & Copper Co., Chicago, Ill.
Scovill Mfg. Co., Chicago, Ill.

BOOTHS.
Yesbera Mfg. Co., Toledo, O.

CABLE CLIP.
Bullard & McElligott, Pittsburgh, Pa.
National Tel. Supply Co., Cleveland, O.

CABLES.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Chicago Insulated Wire Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
National Wire Corporation, New Haven, Conn.
Okonite Co., New York.
Roebling's Sons Co., John A., Trenton, N. J.
Standard Underground Cable Co., Pittsburg, Pa.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

CABLE HANGERS.
Bissell Co., The F., Toledo, O.
Bullard & McElligott, Pittsburg, Pa.
Cook, Frank B., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
National Telephone Supply Co., Cleveland, O.
Standard Underground Cable Co., Pittsburg, Pa.

CABLE SLEEVES.
Nagel, W. G., Electric Co., Toledo, O.

CARD INDEX SYSTEMS.
Telephone Printing Co., Defiance, Ohio.

CLIMBERS.
Klein & Sons, Mathias, Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.

CONDUITS.
American Conduit Co., Chicago, Ill.
American Vitrified Conduit Co., New York.
Camp Co., The H. B., New York.
Gest, G. M., Cincinnati, O.
Nagel, W. G., Electric Co., Toledo, O.
Standard Vitrified Conduit Co., New York.
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.

CONNECTORS.
Benedict & Burnham Brass & Copper Co., Chicago, Ill.
Cook, Frank B., Chicago, Ill.
McIntire Co., C., Newark, N. J.
Nagel, W. G., Electric Co., Toledo, O.

CONSTRUCTION SUPPLIES.
American Electric Tel. Co., Chicago, Ill.
Electric Appliance Co., Chicago, Ill.
Erner Hopkins Co., Columbus, O.
Farr Tel. & Const. Supply Co., Chicago, Ill.
Hemingray Glass Co., Covington, Ky.
Inland Steel Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
Lanz, M., & Sons, Pittsburg, Pa.
Nagel, W. G., Electric Co., Toledo, O.
Scovill Mfg. Co., Chicago, Ill.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

CONSTRUCTION TOOLS.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Electric Appliance Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

COPPER.
Benedict & Burnham Brass & Copper Co., Chicago, Ill.
Scovill Mfg. Co., Chicago, Ill.

CORPORATION RECORD BOOKS.
Middleton & Co., J. W., Chicago, Ill.

CROSS ARM BRACES.
Inland Steel Co., Chicago, Ill.

CROSS ARMS.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Central Mfg. Co., Chattanooga, Tenn.
Cohn & Bock, Princess Anne, Md.
Lewis Lumber & Mfg. Co., Hattiesburg, Miss.
Nagel, W. G., Electric Co., Toledo, O.

ENGINEERS and CONTRACTORS.
Butterfield, J. F., Chicago, Ill.
Crumb, W. H., & Co., Chicago, Ill.
Imperial Finance & Construction Co., Chicago, Ill.
Keeling & Ridge Co., Pittsburg, Pa.
Stanton, L. W., Cleveland, O.

FUSES.
Cook, Frank B., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.

GERMAN SILVER.
Scovill Mfg. Co., Chicago, Ill.

GUY ANCHORS.
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Nagel, W. G., Electric Co., Toledo, O.

INSULATING MATERIAL.
Bissell Co., The F., Toledo, O.
Nagel, W. G., Electric Co., Toledo, O.
Okonite Co., New York.
Standard Underground Cable Co., Pittsburg, Pa.

CONTINUED ON PAGE 35.

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TRADE NOTES

The Sterling Electric Company, Lafayette, Ind., has just finished sending out a complete folder describing its various protective apparatus. This folder will be sent to any one for the asking.

The F. Bissell Company, of Toledo, Ohio, reports unusually large sales of its Marline cable hangers. The company finds it difficult to keep ahead of the demand, although working an extra force of men in its factory.

The H. H. Franklin Mfg. Company, of Syracuse, N. Y., has issued an attractive booklet entitled "The Cast of a Die," which illustrates in a forceful manner the adaptability of its process of die casting for intricate mechanical parts. This company also wishes to call the attention of the trade to the fact that no other concern is licensed to sell "finished castings" under its processes or patents.

The Central Telephone and Electric Company, of St. Louis, Mo., has purchased the buildings formerly occupied by the Missouri Medical College. The buildings have a frontage of 83 feet on Lucas avenue, and a depth of 145 feet on Twenty-second street. The lot is located in the factory district, and on account of the substantial character of the buildings is considered a very desirable property. The company will use the buildings for a factory and store room.

The Connecticut Telephone and Electric Company, of Meriden, Conn., has just issued its new catalogue No. 8. This issue is most complete, covering exchange apparatus and also a large line of interior telephone systems. The Connecticut Company has as large a line of apparatus as any other telephone company, and it is manufacturing all parts from the raw material in its own factory. A copy of the new and enlarged catalogue will be mailed on request, also the various bulletins.

Mr. Frank B. Cook has recently returned from a trip to the Black Hills, where he has been looking after his interests in the Deadwood Home Telephone Company, which he owns. He reports the Company in a flourishing condition and says that it is rapidly passing its Bell rival in the competition for subscribers. Mr. Cook returned by way of Omaha, Council Bluffs, and Des Moines, where he called on the trade.

The International Telephone Manufacturing Company, of Chicago, reports an increasing demand for its never failing self-restoring drop switchboard, and also for its various types of telephones, including the four-party selective equipment. Among recent installations made by this company in Indiana might be mentioned switchboards and equipment for the Daleville Telephone Company, Summitville Telephone Company, Medford Home Telephone Company, and Frankton Telephone Company. These exchanges are equipped throughout with International express type or mechanical self-restoring drop switchboards, International series exchange and four-party line selective telephones.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Savings & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

FREE Sample to Agent. Practical ready call device for telephones. Saves brain work and hours of time. Sells itself. One sale sells dozens. Seeing is believing. Send stamp. The Telephone Appliance Co., One Madison Avenue, Dept. A. T. J., New York City. 193

FOR SALE—Switchboards and Telephones, all capacities and makes, Terminals, Cross-connecting Racks, Cable, &c., at less than half cost of new. Guaranteed reliable and efficient. Chicago Telephone Apparatus Exchange, 17 S. Elizabeth St., Chicago, Ill. 184

FOR SALE—Controlling interest in telephone company. Incorporated for $5,000. Good, new plant. Good town. For full particulars write. GEORGE CRESS & CO., Effingham, Kas. 200

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by American Telephone Journal.
GILDART BROS., Albion, Mich. 168

WANTED—By man and wife, exchange of 50 to 100 telephones. Have had about six years' experience. Wages right. References furnished. Address, Box 199, American Telephone Journal, 116 Nassau street, New York City. 199

SUCCESSFUL and experienced telephone man desires position as manager of Independent plant in the South or West. At present manager of 500-line common battery plant with extensive toll line connections, but desires to leave as his company has been duped into a Bell sub-license arrangement that is objectionable to him. Thirty years old; temperate. Best recommendations from present and former employers. Address, Box 191, American Telephone Journal, 116 Nassau St., New York City. 191

POSITION WANTED as manager or superintendent of an Independent telephone company by man with four years' experience with Bell companies. Would lease an exchange or operate it for part of the profits. Best of references given. Address Box 197, American Telephone Journal, 116 Nassau street, New York. 197

WANTED—Telephone engineer that is an A1 draughtsman, with ability to handle men, and is familiar with cable work and outside construction. Address, Box 202, American Telephone Journal, 116 Nassau street, New York City. 202

POSITION wanted by a practical telephone man as superintendent of a telephone system or as a salesman on the road. Experienced in all branches of operation. Address Box 195, The American Telephone Journal, 116 Nassau St., N. Y. City. 195

POSITION wanted as superintendent or manager. Thoroughly experienced in magneto and common battery systems. Also with selective party line signaling. Have had charge of right-of-way department for the past two years in a district of five thousand subscribers. Experience gained with Bell company in the East. Address, Box 194, American Telephone Journal, 116 Nassau Street, New York City. 194

WANTED—Second-hand Telephone Apparatus, Central Energy and Magneto Switchboards, Telephones, Bridging Bells, Transmitters, Terminals, Cross-connecting and Distributing Racks, Ringing Generators. State details, price, condition and make. C. E. W., 17 S. Elizabeth St., Chicago, Ill. 188

POSITION WANTED—An up-to-date telephone man, with best of reference as to ability and character, would like position in good Southwest town. At liberty August 1st. Address, P. O. Box 340, Cedar Rapids, Ia. 192

WANTED—Manager for a telephone plant of 1,500 subscribers. Must have a knowledge of the telephone business, not afraid of work, and have an affable manner in dealing with subscribers and meeting the public. Address, Box 201, American Telephone Journal, 116 Nassau street, New York City. 201

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is the care we take about tracing Pole Shipments. We aim to keep our finger on every car we load, from the time it leaves our yard, to the time it enters yours. Hadn't you better get our Prices before you order that next car?

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Pittsburgh Agents, TIPPER & PATTON, 513 Bessemer Building.

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

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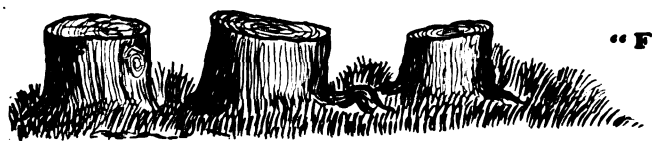
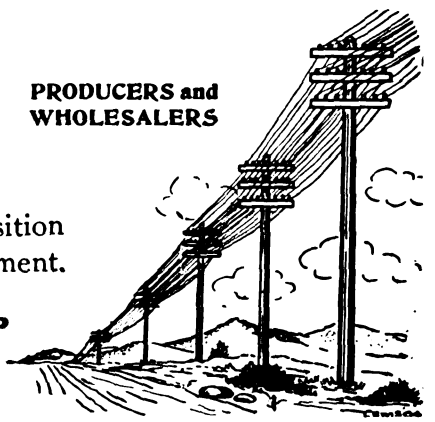
WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



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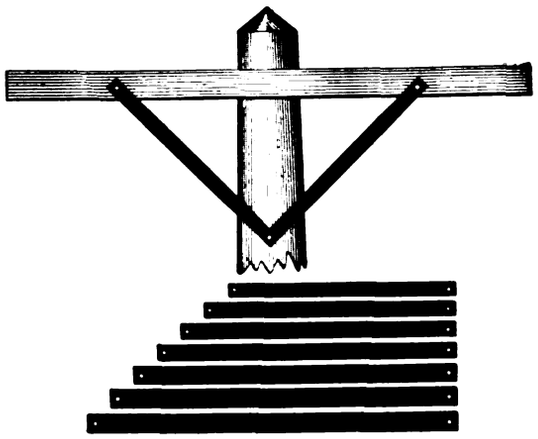

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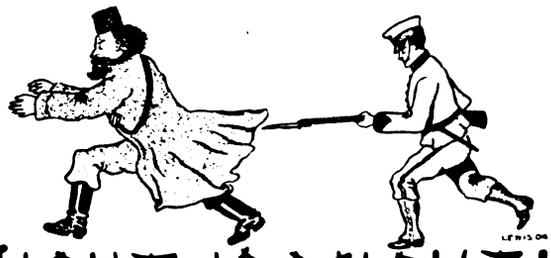

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A letter from you asking prices or other information will have the same prompt and courteous consideration that we would give an order for 100 carloads of poles.

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A Good Telephone

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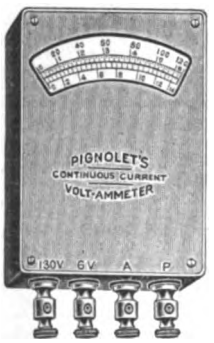
NEW YORK SAN FRANCISCO CHICAGO PHILADELPHIA CLEVELAND ATLANTA

You Will Find It Pays To Test



your lines periodically for insulation and resistance, This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone work and are low in price.

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ATTORNEYS.
Munk, Otto, New York City.

BATTERIES.
Electric Appliance Co., Chicago, Ill.
National Battery Co., N. Y. City.
Nungesser Electric Battery Co., Cleveland, O.
Roche, Wm., New York.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

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J. W. Middleton & Co., Chicago, Ill.

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Benedict & Burnham Brass & Copper Co., Chicago, Ill.
Scovill Mfg. Co., Chicago, Ill.

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Yesbera Mfg. Co., Toledo, O.

CABLE CLIP.
Bullard & McElligott, Pittsburgh, Pa.
National Tel. Supply Co., Cleveland, O.

CABLES.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Chicago Insulated Wire Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
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Okonite Co., New York.
Roebling's Sons Co., John A., Trenton, N. J.
Standard Underground Cable Co., Pittsburg, Pa.
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Nagel, W. G., Electric Co., Toledo, O.
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CABLE SLEEVES.
Nagel, W. G., Electric Co., Toledo, O.

CARD INDEX SYSTEMS.
Telephone Printing Co., Defiance, Ohio.

CLIMBERS.
Klein & Sons, Mathias, Chicago, Ill.
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CONDUITS.
American Conduit Co., Chicago, Ill.
American Vitrified Conduit Co., New York.
Camp Co., The H. B., New York.
Gest, G. M., Cincinnati, O.
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Standard Vitrified Conduit Co., New York.
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.

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Farr Tel. & Const. Supply Co., Chicago, Ill.
Hemingray Glass Co., Covington, Ky.
Inland Steel Co., Chicago, Ill.
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CONSTRUCTION TOOLS.
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Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

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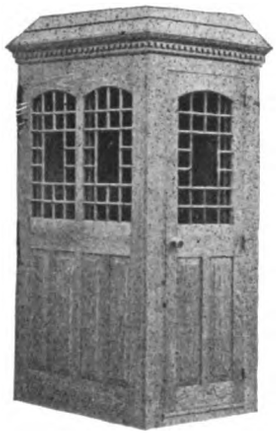

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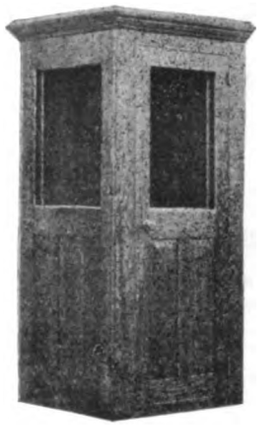

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25 to 80 ft. long.

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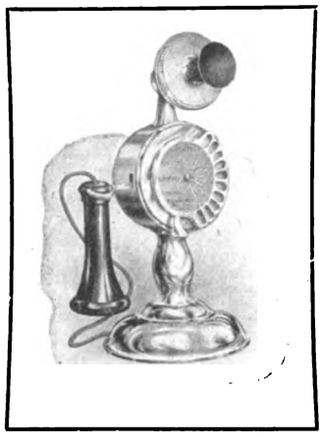
But will we ever own
A cussless, waitless, out-of-order-less
Girlless telephone?

—*Life.*

This Is It



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AUTOMATIC ELECTRIC COMPANY

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Waverly Park, NEWARK, N. J.

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PARIS. FRANCE—E. H. Cadiot, 12 Rue St. Georges.
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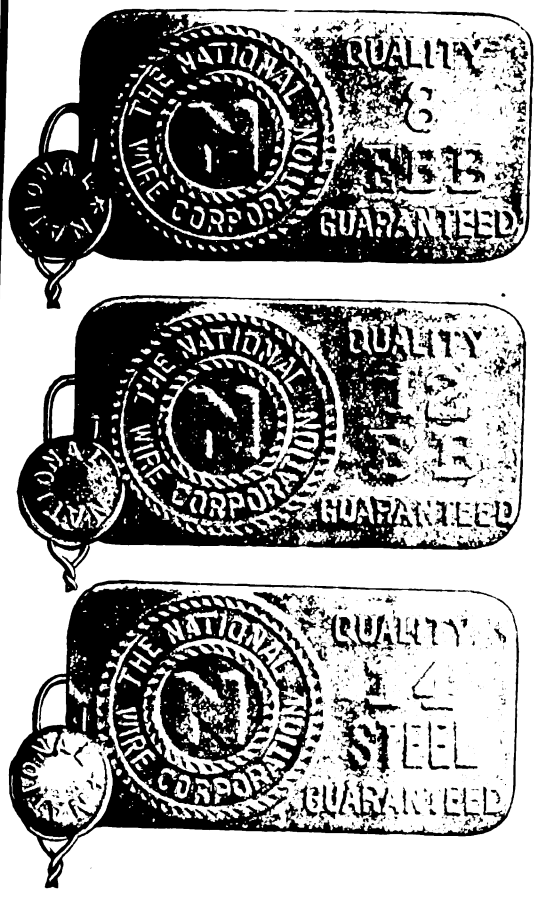

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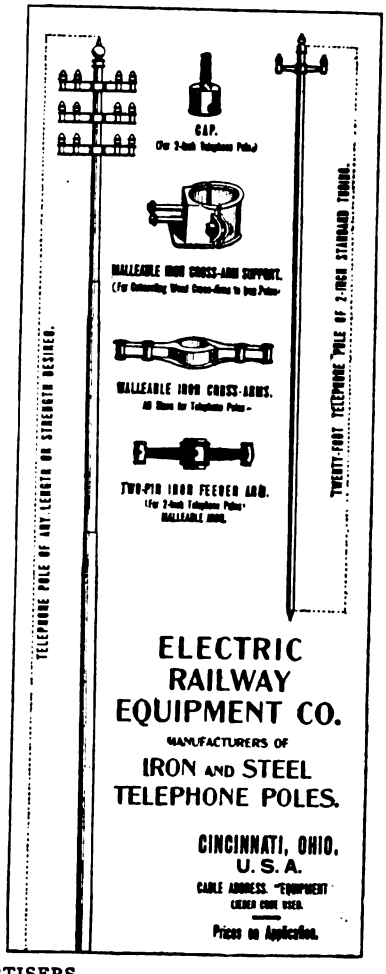

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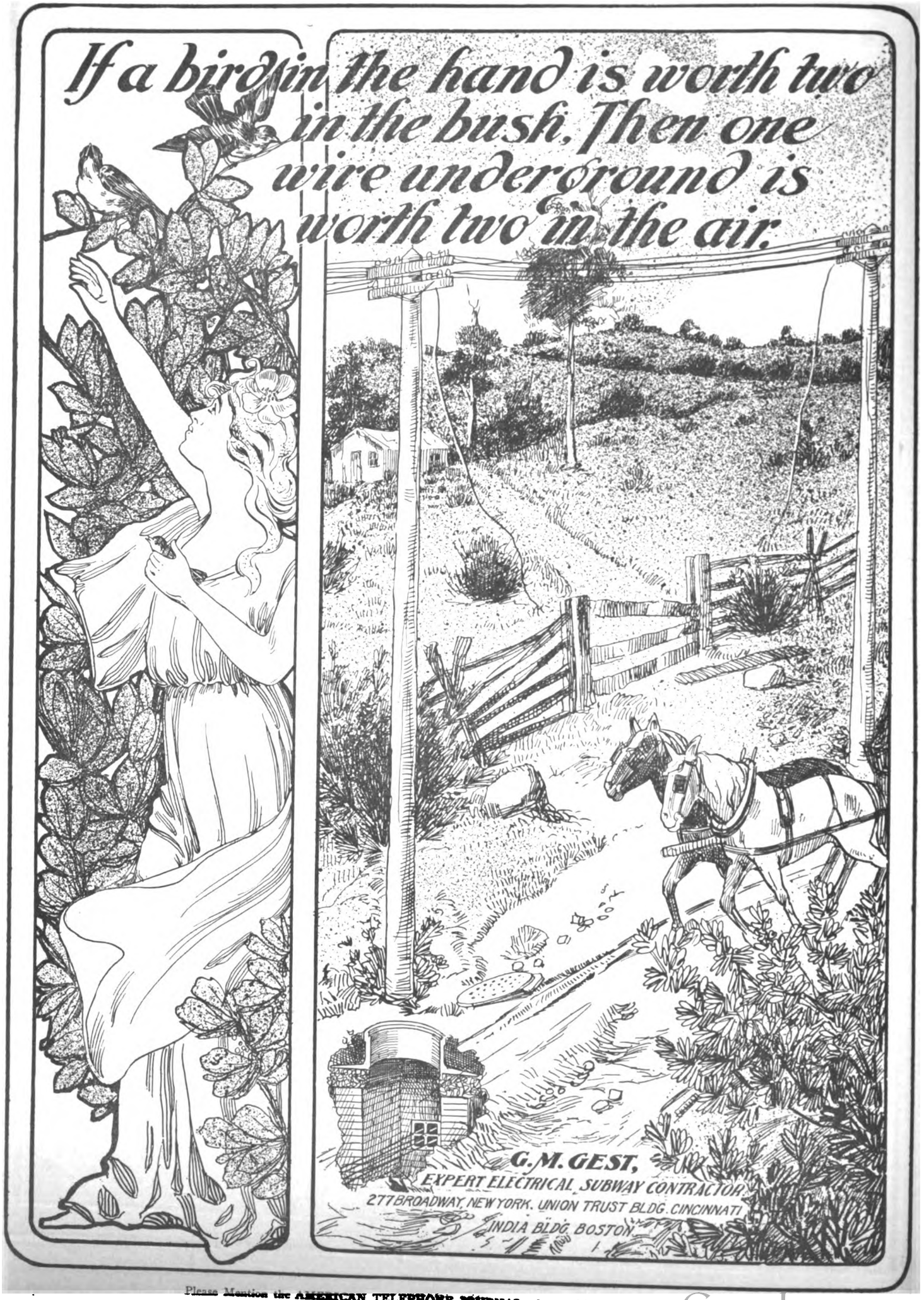

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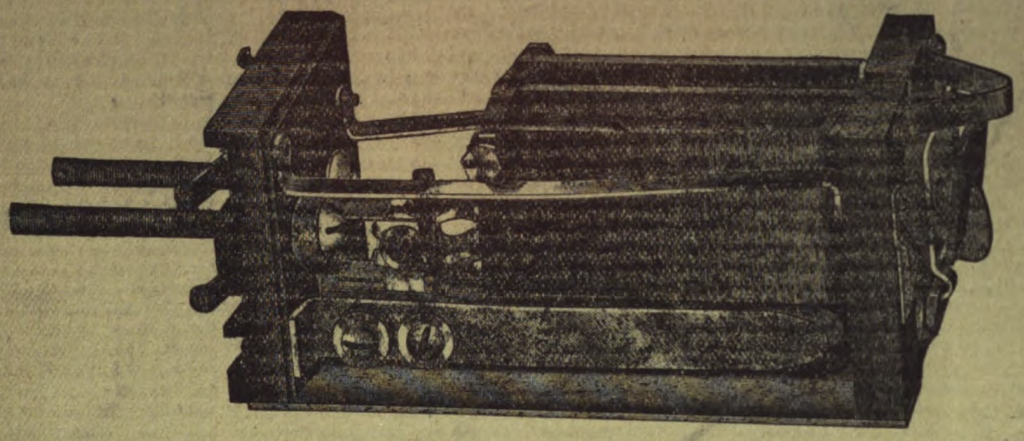

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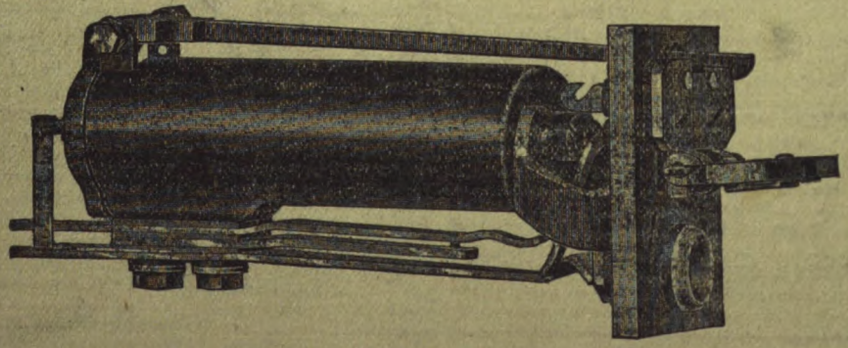

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Volume 10 NEW YORK—JULY 9, 1904—CHICAGO Number 2

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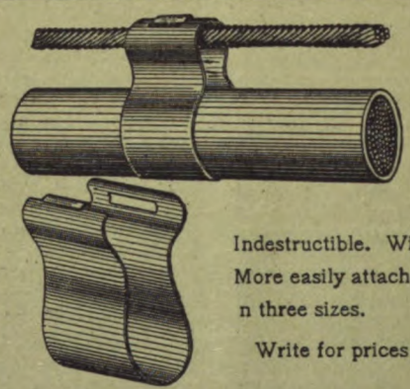

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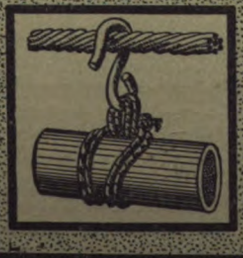

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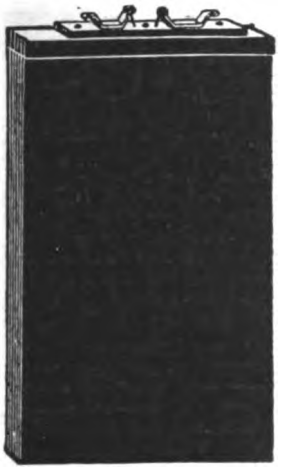

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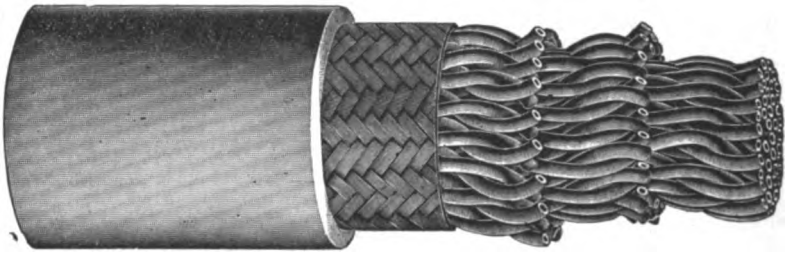

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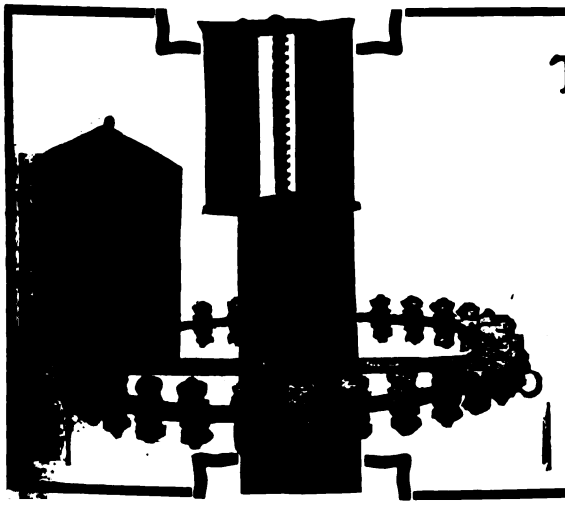

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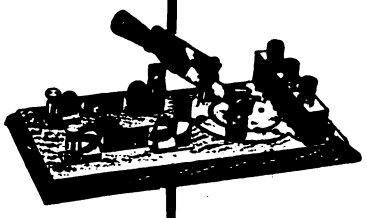

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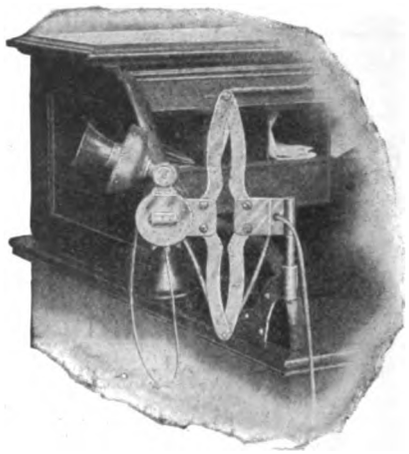

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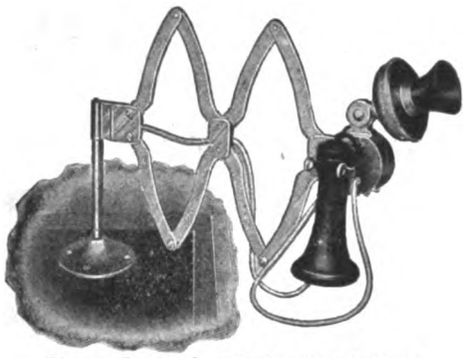

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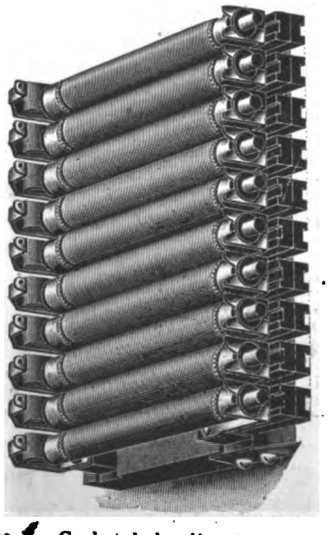

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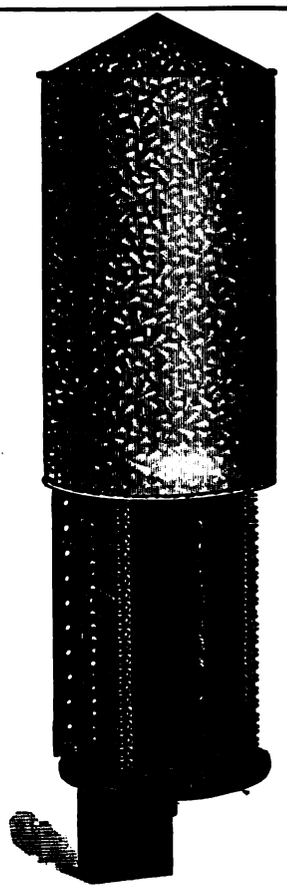

Type SS.—Cook Pole Cable Terminal, with line fuse and carbon plate arresters and metal cover. Pat. May 20, 1890; Oct. 21, 1902; other patents pending. All sizes, 5 pairs up.

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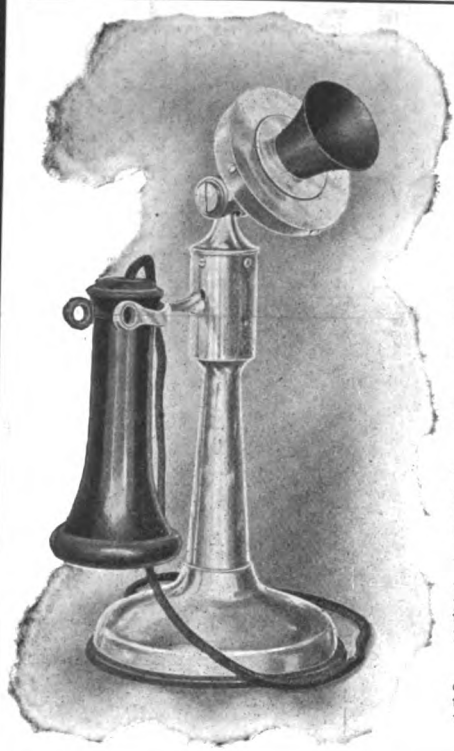

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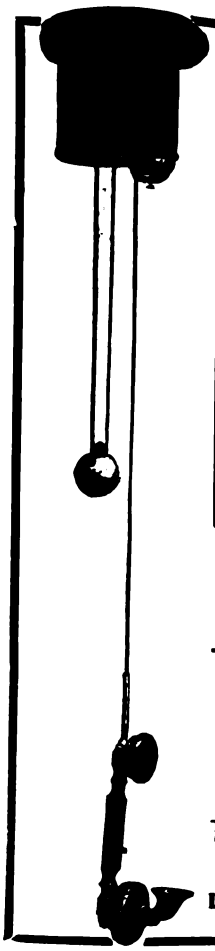

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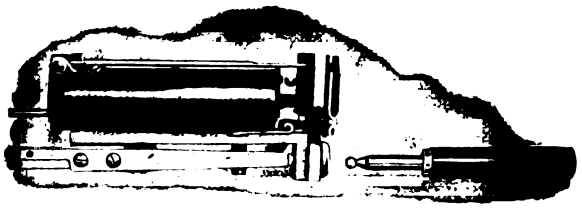

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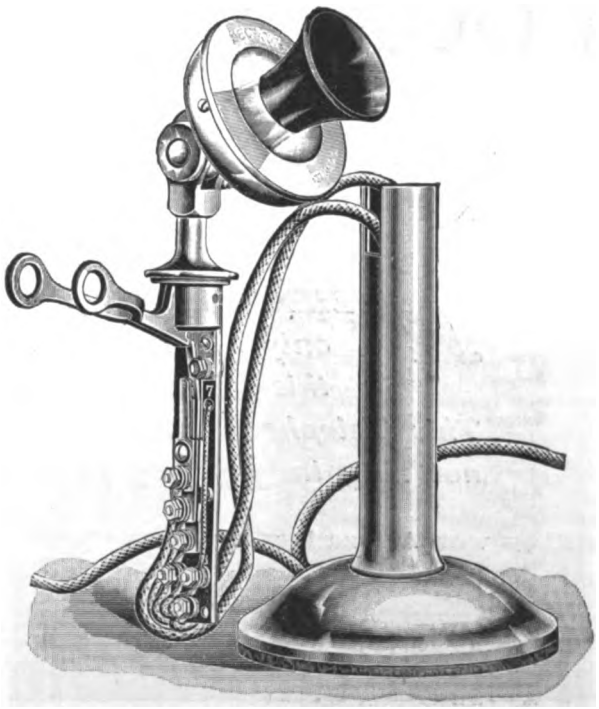

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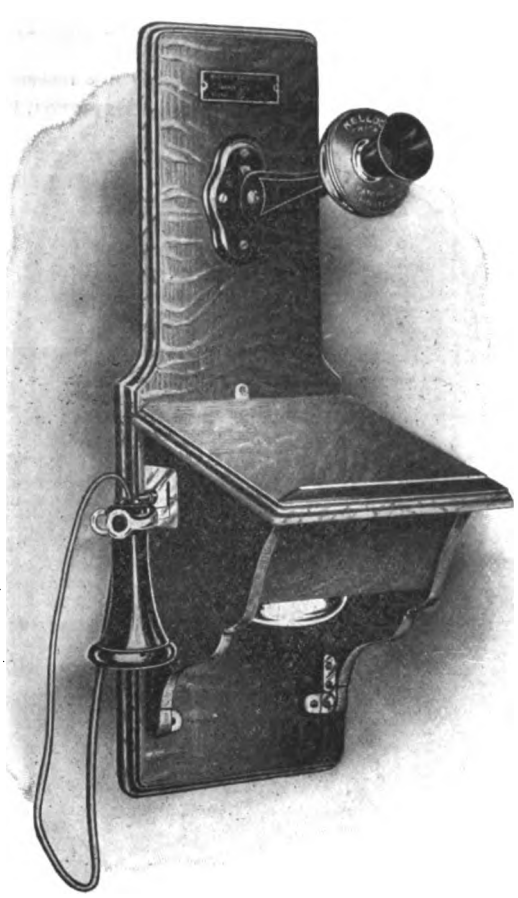

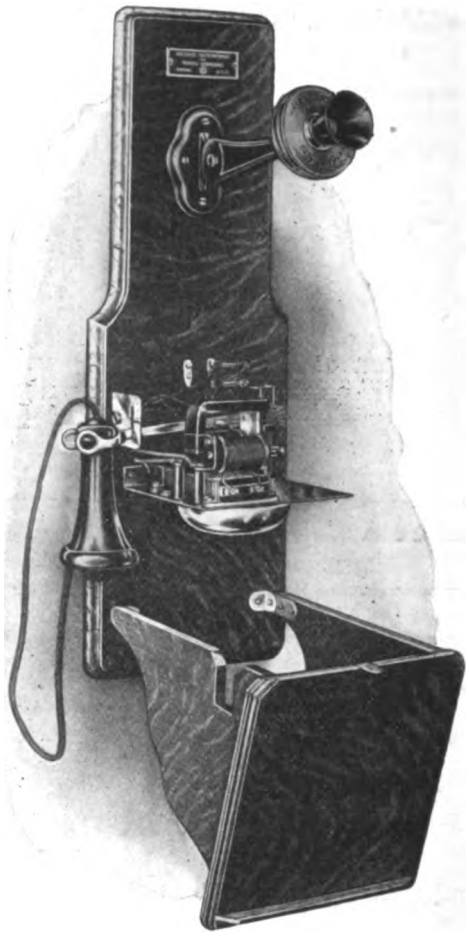

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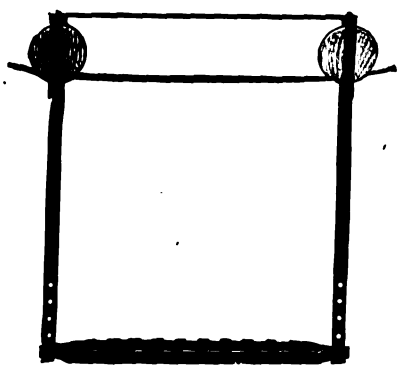

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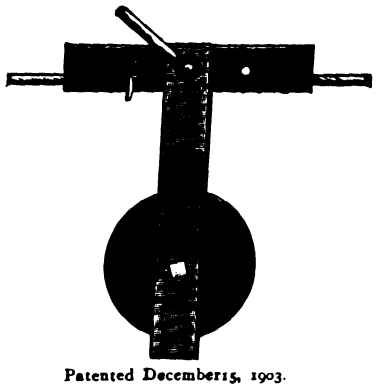

Patented December 15, 1903.
"Ready" Cable Trolley

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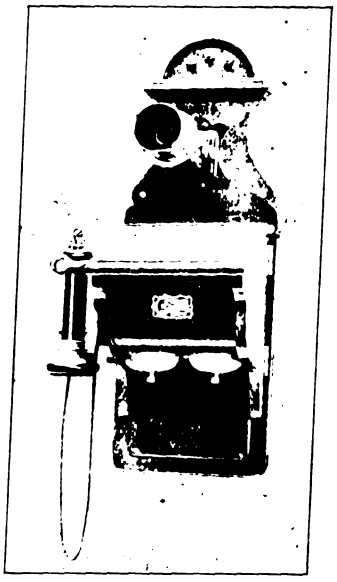

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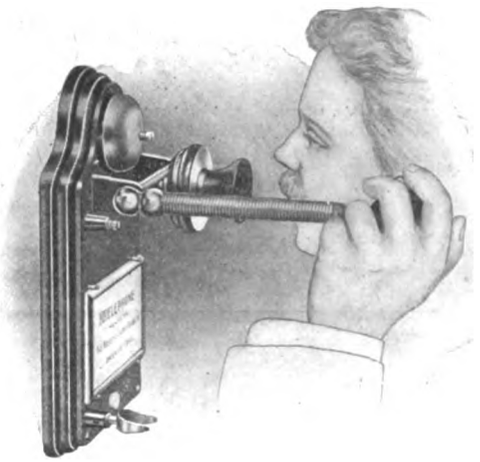

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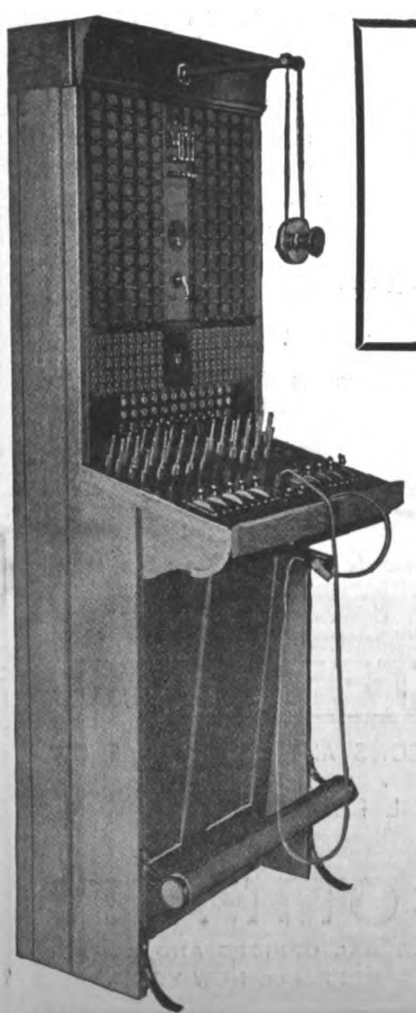

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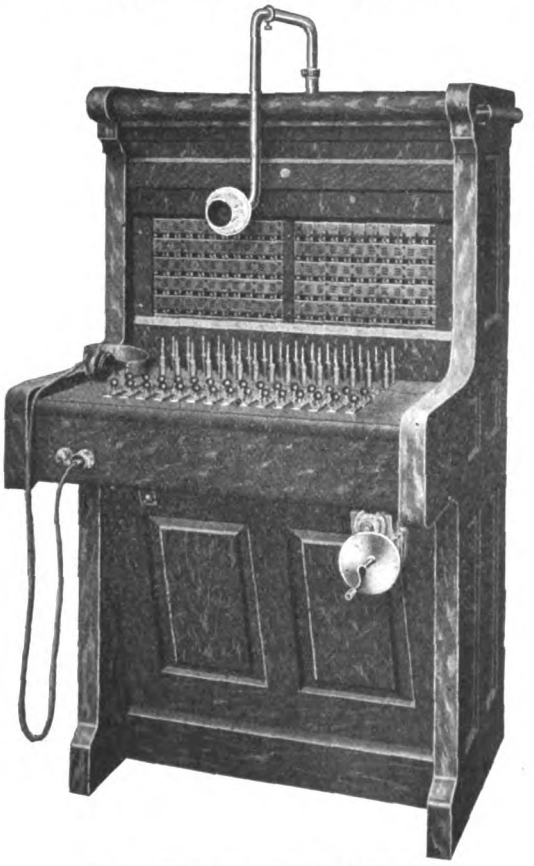

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June 6 , 1904.

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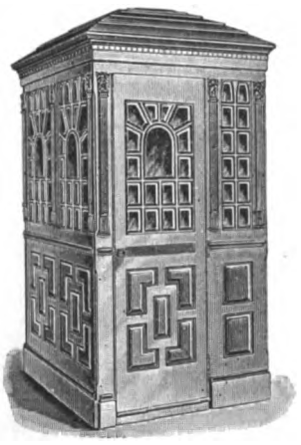
Pres't & Mgr



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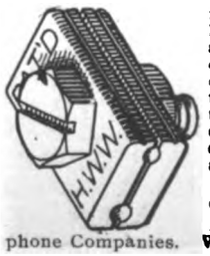

is a standard article of this kind. Each plate has two accurately formed grooves of different depths. By reversal of one plate around the bolt, this test-connector is **applicable to two wires of the same or of different diameters, large or small, toll or exchange, main or branch, terminating or through wires.**

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The American Telephone Journal

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VOLUME 10 SATURDAY, JULY 9, 1904 NUMBER 2

THE TELEPHONE IN THE JAPANESE ARMY

IT may perhaps have occurred to our readers that the wonderful successes that have fallen to the lot of the Japanese army in its conflict with Russia, have been due in a measure to some superior method of signalling not possessed by the opposite forces. In a great measure this is true, and it is to the successful use of the military telephone that some of the greatest strategical movements have been made. The use of the telephone as an adjunct to military campaigning dates back to the Spanish-American War, when its successful use both in Cuba and the Philippines made it at once one of the greatest necessities and aids to military work.

When General Kitchener laid his plans for the successful defeat of the Arab dervishes in the Soudan, two years were spent in reconnoitreing and laying plans which culminated in the final battle of Omdurman. It was here that the telephone demonstrated in a particular manner its desirability in place of any other method of signalling. The Arabs were never known to attack except at such times when they supposed the British troops were not ready to repulse them, consequently though scouting forces were sent forward to secure details of the country, it was not practical in many instances to use the heliograph, on account of its betraying their position, which would result from the flashing of the signals, but with the telephone this difficulty was overcome, and communications and orders were given from the general officers' headquarters without in any way interfering with the ultimate result of the movement contemplated.

A Japanese Telephone Outpost.

The Japanese are notable for their ready adaption of the highest class of military tactics and their engineer corps, which takes the place of the signal service in the United States, is probably one of the best officered and manned departments that has ever been with an army corps. The battle of the Yalu River brought to the front in a forcible manner the advantages to be secured by means of the telephone. The town of Wiju was used as a base from which to direct movements of the main army. Telephone lines were strung out to both flanks of the attacking lines and also to the center portion of the advancing forces. By means of the telephonic communications the Japanese were able to surround the Russians, and effect a capture of 28 guns. The telephone engineers are men who have had thorough technical and practical experience in the telephone business; in fact, are civilians who have only donned the uniform as the emergency demanded, and it might be said here that the major portion of the Japanese army is estimated to be made up of civilians, who like our own National Guard, have come to the front as an efficient fighting force.

The difficulties necessary to maintain a telephone line through a hostile country are many and varied, and not the least requisite is one of great moral courage. In building military telephone lines, the topography of the country has to be considered, and in the case of the Japanese advance through Corea, difficulties of great magnitude had to be overcome. Yet with it all, at frequent times, the telephone department of the engineering corps completed its line in advance of the troops even under forced marching. The necessary implements and apparatus were carried whenever possible in bullock carts, but as the lines advanced into wild country where roads even of the miserable character which had served as a passageway for the wagons ceased, then it was necessary for the coils of wire to be slung over the shoulders of the men and carried great distances on foot. Our illustration shows an engineer post in the village of Sunam. It might be well to draw the attention of the reader to some particular points of interest which might not evidence themselves. It will be noticed that there are three lines entering the hut, and also that there are three men apparently engaged in receiving and transmitting telephone communications. One of these men acts as a transmitter in reporting the news to the commanding

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officer, another listens to the commands as they are received and writes them out, the third checks the message both ways. In this manner a large amount of accuracy is obtained and the reports and commands are successfully transmitted. The reason for the use of three is perhaps obscure to the mind of the average telephone user. It must be remembered that in the rapid work of construction which is necessary under these conditions, that the adjustment of the apparatus is not of the best. The crude construction does not admit of the best results according to commercial standpoints, consequently to avoid errors the number of men engaged upon the work of transmitting and receiving messages is increased. When the war is over and the censorship is withdrawn from the reports of foreign correspondents, it is believed in military circles that the use of the telephone from a military standpoint has done more toward successful manœuvres during a campaign than has the sheer force of arms.

An interesting point which thoroughly illustrates the desirability of the telephone as a means of rapid communication was given at the battle of the Yalu. When the right and left wings of the Japanese army were swinging round the ends of the defending forces of the Russians, the artillery of one of the flanks for a moment was directing its fire into the opposite Japanese flank. However, the telephone rose to the occasion and within a few moments orders had been given from the headquarters at Wiju which changed the range of fire and so saved many lives. Similar unfortunate accidents have occurred before, noticeably during the Civil War, but then the telephone had not been invented, and there were no methods for rapidly communicating orders except by flash signals, and in dull weather even this means was impossible and messengers had to be used.

TELEPHONE CONDITIONS IN GREAT BRITAIN AND THE CONTINENT OF EUROPE*

By M. S. Connor.

THE telephone situation outside of the United States presents many features worthy of consideration. The majority are of value to strengthen faith in American practice and prevent experiments that would often result disastrously. But there has been considerable work on the other side that is commendable, and well worth careful study.

In England the telephone business vested by law in the hands of the General Post Office. When the telephone appeared the Post Office officials farmed out its exploitation. As a result the Kingdom was divided among several operating companies independent of each other. After a few years the Post Office assumed control of the long distance lines and the several operating companies were consolidated into the National Telephone Co. (Ltd.). This company was given a new charter which expires in 1911, and there is much agitation as to what turn telephone affairs will take. The English people entertain a feeling for the National Telephone Company similar to that toward the Bell interests in this country. There is no doubt that this feeling is merited, but the National Telephone Company have some excuse, as they know that their lease of business existence has but a short time to run and as they cannot tell what the future has in store, they have decided to "make hay while the sun shines."

The Post Office has now entered the operating field in London and have several general agency exchanges in operation. It is working in harmony with the National Telephone Company, charging the same rates and trunking between both systems. In England a trunk line is called a junction line, and a toll line a trunk line.

The action of the Post Office is taken by many to mean that it contemplates, sometime, purchasing the business of the National Telephone Company; that it is now principally interested in seeing that the telephone material installed will be of use in the future, and in getting sufficient experience to handle the business.

The career of the National Telephone Company has been filled with many hardships, as it has had to contend with extraordinary harsh treatment by various municipalities. It has never been able to get street rights in London and, all the lines are overhead with the exception of the wires rented from the Post Office. Overhead wires are mounted on horses, are fastened to the tops of buildings, necessitating a contract with each householder. Many times it has been necessary to move an entire run merely to satisfy the whim of some land owner who refused to have them pass over his property any longer.

Many of the exchanges installed by the National Telephone Company have been schemes that have been thoroughly tried in this country and proved failures, such as flat switchboards, call wire systems and ringing through systems. Only two years ago a large switchboard was installed in Edinburgh on a ring thorough system, and now, it is reported that this board has been converted into a straight central energy one.

The work that the British Post Office is doing in London, leaves little to be desired. From a switchboard and operating point of view, they have copied from the New York Telephone Company. Their underground system and cable distribution might be said to be a copy of that in Paris.

In England practically all of the telephone material is imported. The majority of the apparatus used is manufactured by the Western Electric Company, either in this country or in its Antwerp factory, although other European factories get a portion of this business. Probably this is the direct result of the backwardness of telephone progress and the practical monopoly which has been maintained in the operating field by the National Telephone Company.

There has been a considerable movement in Great Britain in the direction of municipal telephony. This is comparable with the Independent work in this country. The installation of municipal governments in Great Britain, have been antiquated equipments, because they were not laid out by engineers in touch with telephone progress, and manufactured by companies having no experience in large switchboard construction. This is to be deplored, as it has had the effect of preventing the expansion of the telephone business. If the people who became interested had taken the trouble to carefully study the conditions elsewhere, the results would have undoubtedly been different, and there would be many more telephones in the United Kingdom to-day.

All of the telephone systems of any importance on the continent of Europe are under government control. This is particularly true in France, Germany and Belgium. There are well organized departments, but very little attempt to satisfy the customer. The telephone is not a business but merely a means of maintaining a lot of people at the government's expense. The subscriber has no choice of service, but he must take a regular telephone at a regular price or not have any. If he has the misfortune to get into a disagreement with the operator who usually is a relative or friend of a politician, he is very liable to have his telephone removed. Telephone apparatus is kept in service as long as it is possible to use it and all improvements are considered from a theoretical point of view, rather than an economical one. In fact, the cost of operating and maintenance is very seldom considered.

When the large central energy exchange was installed in Brussels, it was feared by the government officials that they would have some difficulty in finding work for all their operators on the new switchboard. The result was that the switchboard could not be operated in the most efficient way. The Minister of Posts and Telegraph in France, when confronted with the fact that a central energy switchboard would save from 30 per cent. to 40 per cent. on the operating expenses, made the remark, "that

*Abstract of paper read before N. Y. State Ind. Tel. Assn., at Buffalo, June 24th, 1904.

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it did not make any difference; when the amount required for operating expenses had been written in the bill of appropriations, that was the end of it." One can expect very little information that will have a tendency to further the advancement of the telephone industry from an operating or a business point of view, in the continent of Europe.

On the other hand some of the substantial construction work is admirable. Within the walls of Paris there are no telephone wires. A single pair lead covered cable goes to each subscriber's instrument.

The three largest telephone exchanges are located in the same building on the Rue Gutenberg, near the city hall. An underground system of over 15,000 pairs of wires was brought into the basement of this building and terminated on the same distributing frame. The cables were all 200 pair and laid loosely in a large box which ran along the side of the city sewers. At various intervals some of these cables were run into distributing rooms, were built underground and divided into smaller sizes by filled cables heads. These cables were then divided up into 7-5-3 and 1-pair cables, with pothead connections.

A very unique system of keeping the cables dry and treating them in case they should become damp from an accidental puncture, consisted of a dry air plant in the exchange basement. A pump driven by an electric motor drew air through a large series of desicators and forced it out into a system of piping. A connection from an air pipe was made with each cable through a small valve. At the opposite end of the cable in the distributing room, was a small valve. When this valve was open and the valve in the exchange turned on, dry air was forced through the cable, absorbing any moisture that might be contained therein. Lead pipes for air were run to each of the distributing rooms and arrangements were made for connecting the air to any of the small cables by means of a union coupling. This system of complete underground wiring has been practically adopted by the Post Office in London, and the cable drying system seems to be considered by most European telephone engineers as a desirable auxiliary feature to any underground plant.

The city of Brussels is wired in a decidedly American fashion; cables running from the exchange through tile conduits to terminal boxes on poles and wires being led from there to the subscribers' premises. A notable feature is that the poles are made of structural iron, handsome in appearance and will probably endure for all time.

The majority of European cities still operate with grounded line switchboards and complete overhead construction. One cannot help but admire the number of years they use a switchboard and some of their long spans of a thousand feet or more from one high pole to another, but the construction would hardly stand an American sleet storm, and the service would be unsatisfactory.

Probably the greatest reason that the telephone systems of Europe are far behind the times from an apparatus point of view, is the fact that they have not been able to see economy in throwing away old material and buying new. As a great many of the cities have entirely outgrown their switchboard capacities, they are slowly reconstructing their systems. In doing so they are getting to be very careful in their investigations of what is being done in other places, they study all of the available systems, invariably lay out their plans along the latest approved lines and buy nothing but the very best apparatus.

This is a procedure that Independent telephone companies here should be more eager to follow. The few extra dollars that it costs to buy the best is of very little importance when compared with the excellence of the service obtained therefrom and the low cost of maintenance.

While one may not see the enormous telephone growth in Great Europe are so far behind the times from an apparatus point of mode plants, from an engineering point of view, with the very best of material and outside construction, thoroughly fire-proof, substantial buildings, efficient protection apparatus and switchboards and telephones carefully designed in every detail, with a view to long life and the very best performance of their various functions. It has been customary to consider the life of a switchboard at eight or ten years. But it has very seldom happened that switchboards were replaced because the parts had actually worn out. Either it was desirable to make a change from a point of view of economy, or the capacity of the cables were too small to accommodate the number of subscribers. The parts of a switchboard such as keys and spring jacks rarely show enough wear to warrant their being thrown away. With a central energy double supervisory automatic signaling switchboard there is everything that can be imagined to lend itself to quick and economical service. With careful designing and construction and the use of the proper materials, will make multiple switchboards last twenty years, and within that time there will be few radical improvements. Inasmuch as supplying telephone service has reached the point where the returns on the investment are only fair earnings, it is necessary to secure capital by investing it in the very best of material, buildings and apparatus.

TELEPHONE CONSTRUCTION*

By W. H. Johnston.

In Telephone Construction, as in almost everything else, foresight is hindsight properly applied. The development of the business has rendered one after another of the older methods inadequate, and has pointed out the need of new schemes. Further than this, it has shown us what to expect and what to prepare for, to meet conditions which have not yet actively manifested themselves. Some time ago, the location of a central office building was not a matter of great import and the pole lines that radiated from it were built to bring in the business that presented itself from day to day. At present, the design and development of a telephone plant is of prime importance, and is as great a factor in the efficiency of the investment as economy in pay rolls and in the purchase of materials.

The introduction of the common battery or central energy system has done more to crystallize the methods of telephone plant construction and to bring about the high standards that are today so generally observed, than any other influence that had previously brought to bear. A local battery system is not a unit in any such sense as the modern common battery telephone plant, because local battery instruments are only dependent upon the central office for switching, while the common battery instrument is energized by the central office equipment, and is practically a part of the switchboard apparatus. Electrically, it makes not a particle of difference whether a given number of miles of line wire connecting two local battery instruments are local lines, or a combination of the local lines and a toll line; but in a common battery systems this point is of great moment. Formerly a switchboard and a separate pair of wires strung hap-hazard to each telephone instrument, constituted a plant, now, each part of the system must bear a particular relation to every other part; or the result will not be satisfactory. The thought and experiment involved in the development of the common battery have been handsomely rewarded by the greater economy of operation and in efficiency of service. Conduits, cables, good rubber insulation, and that much condemned though worthy art, tree trimming, were all known before the advent of common battery; but it was the common battery that made their necessity so manifest, and has developed the use so thoroughly.

While the standardization of details of construction is perhaps to be striven after rather than to be confidently expected—because invention and improvement is so much the spirit of the age—the lesson taught, is that the telephone plant is a case of electrical power transmission by minute quantities, and that the present local line resistance of a 24-volt system, with ordinary

*Abstract of paper read before N. Y. State Ind. Tel. Assn., at Buffalo, June 24th, 1904.

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central office apparatus, is from 500 to 800 ohms. There is more in this idea than will perhaps at first appear, and its results are of a greater importance in larger centers of population than in small ones. The net economy of operation is a balance between pay roll expenditures and interest on the investment. Bearing the electrical limit in mind, it is obvious that the cost of line construction must be kept at a minimum in order to avoid losing the advantage afforded by a compact single central office system. On the other hand, it is easy to see that a handsome economy in plant design, may prove a very expensive arrangement when operating charges are calculated.

In the first burst of enthusiasm that heralded the new school of telephone construction, some money was wasted in unessentials that reaped no adequate return. Now, by experience the average telephone man has a pretty thoroughly defined idea of what is necessary to insure good, permanent service and how much and what quality of it is needed in each particular case. The items of development that are most noteworthy, are greatly increased use of paper insulated lead covered cable and the employment of methods of complete underground distribution.

In the days of the local battery, it was understood that lines must be kept free from grounds, but the absolute necessity of strong ship-shape work was not clearly demonstrated until the new system came into use. We care for our plant systematically now. We watch slack wires, loose corners, leaky cables and districts in which electrolysis makes its appearance as never before, we work all night to clear up a case of trouble that a few years ago would have been passed over to the next day's list; we inspect instruments, wires, poles and cables so that we may detect and remedy, if possible, incipient defects before they have the opportunity to do harm. It is gratifying to know that the telephone has become such a popular institution, and is so extensively used that methods of construction and maintenance which would have been prohibitively expensive some years ago, used in their present wholesome ways, are actual economies and result in considerably decreased costs in installation and operation.

THE INTERNATIONAL ELECTRICAL CONGRESS

AT the International Electrical Congress to be held in St. Louis from Sept. 12 to the 17th over 160 specially written papers will be read.

Efforts are being made to secure the MSS. of as many of the 160 papers at as early a date as possible, in order to have them printed in advance and distributed among the Congress members at St. Louis. Thus far six papers have been delivered, and many more are promised.

One thousand certificates of membership have been issued to those who have become members by sending in their subscription, and about 100 more certificates are about to be issued. In all over 1,700 acceptances have been received for membership in the International Electrical Congress. The programmes scheduled for Sections D and E are herewith given as being of interest to those of our readers in the engineering field:

SECTION D.

Electric Power Transmission. Chairman, Mr. Chas. F. Scott. Secretary, Dr. Louis Bell.

Name of Author. *Title of Paper.*

Sig. E. Bignami, "Electrical Transmission Plants in Switzerland."

H. M. Hobart, "Conditions Conducive to Economy in Motor Design."

Mons. Maurice Leblanc, "Transmission of Alternating Currents Over Lines Possessing Capacity."

Prof. G. Mengarini, "Utilization of Hydraulic Powers in Italy."

Prof. F. G. Baum, "High-Potential Long-Distance Transmission and Control."

F. O. Blackwell, "The Tower-System of Line Construction."

H. W. Buck, "The Use of Aluminum as an Electrical Conductor."

V. G. Converse, "High-Tension Insulators."

M. H. Gerry, Jr., "Line Construction and Insulation for High Tensions."

L. M. Hancock, "Bay Counties Transmission System."

R. L. Hayward, "Some Practical Experiences in the Operation of Many Power Houses in Parallel."

J. F. Kelly and A. C. Bunker, "Long-Distance Power Transmission."

P. M. Lincoln, "Transmission and Distribution Problems Peculiar to the Single-Phase Railway System."

R. D. Mershon, "The Maximum Distance to which Power can be Economically Transmitted."

P. N. Nunn, "Pioneer Work of the Telluride Power Company."

J. S. Peck, "The High-Tension Transformer in Long-Distance Power Transmission."

Dr. F. A. C. Perrine, "American Practice in High Tension." N. E. L. A. Paper.

Dr. C. P. Steinmetz, "Theory of Single-Phase Motors." A. I. E. E. Paper.

SECTION E.

Electric Light and Distribution. Chairman, J. W. Lieb., Jr. Secretary, Gano S. Dunn.

Prof. André Blondel, "Impregnated Arc-Light Carbons."

Herr Max Déri, "Single-Phase Motors."

Herr E. de Fodor, "Rates for Electricity Supply."

Sig. Ing. E. Jona, "Insulating Materials in High-Tension Cables."

Prof. W. Kübler, "Upon a Means for Compensating the Series-Connection of Induction Motors."

Herr Karl Roderbourg, "Storage Batteries."

Sig. Ing. Guído Semenza, "Commercial Limits of Electric Transmission, with Special Reference to Lighting Service."

Dr. G. Stern, "The Superiority of the Alternating Current for Distribution in Large Cities."

Dr. W. Wedding, "Measurements of the Energy of Light and Heat Radiation from Electric Light Sources."

Arthur Wright, "Recent Improvements in Electrolytic Meters."

Prof. S. P. Thompson, subject to be announced.

B. A. Behrend, "The Testing of Alternating-Current Generators."

George Eastman, "Protection and Control of Large High-Tension Distribution Systems." N. E. L. A. Paper.

W. C. L. Eglin, "Rotary Converters and Motor Generators in Connection with the Transformation of High-Tension A. C. to Low Tension Street Current." Assn. Ed. Illg. Cos. Paper.

W. L. R. Emmet, "The Effect of Steam Turbines on Central Station Practice."

Louis A. Ferguson, "Underground Electrical Construction." Assn. Ed. Illg. Cos. Paper.

Gerhard Goettling, "Storage Batteries as an Adjunct to Central Station Equipment." Assn. Ed. Illg. Cos. Paper.

G. Ross Green, "American Meter Practice." N. E. L. A. Paper.

Caryl D. Haskins, "Metering Efficiency on Customers' Premises."

Francis Hodgkinson, "Steam Turbines."

John W. Howell, "Incandescent Lamps."

Philip Torchio, "Distributing Systems from the Standpoint of Theory and Practice."

W. F. White, "The Selection of a Distributing System for a Large City."

Invitations to send delegates have been sent to thirty national electrical and scientific bodies all over the world.

The following bodies have already promised to hold simultaneous conventions and joint sessions:

The American Institute of Electrical Engineers.

The American Electrochemical Society.

The American Physical Society.

The International Association of Municipal Electricians.

The American Electrotherapeutic Association.

The following bodies have promised to send delegates to the congress:

The National Electric Light Association.

The Association of Edison Illuminating Companies.

In Europe the following bodies have promised to send delegates to the congress:

The Société Internationale des Electriciens.

The Schweizerischer Elektrotechnischer Verein.

It is expected that the Institution of Electrical Engineers of Great Britain and the Elektrotechnischer Verein of Berlin will also send delegates.

All delegates of the co-operating bodies are invited to read papers before any section of the congress they select. Such papers will be printed in the Congress Transactions as being offered by the delegate on behalf of the co-operating body. The paper and discussion thereon will subsequently be offered by the congress to the co-operating body for incorporation in its own Transactions, if desired.

All communications concerning the Congress should be addressed to the general secretary, Dr. A. E. Kennelly, Harvard University, Cambridge, Mass.

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TELEPHONE EXCHANGE ENGINEERING

ARTICLE XVIII.—TOLL-TIMING APPARATUS

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

THERE are various methods used in telephone exchanges for timing long distance conversations. Probably the most common is the ordinary clock, sometimes regulated hourly from a common station. Usually one clock is provided for all operators, located in a convenient position on the wall of the exchange room. Unless this clock is in the direct line of vision, so that a line perpendicular to the face of the dial will pass through the operator's eye she will read the time incorrectly at different positions of the hands. If several operators are using the same clock, only one can be directly in front of the dial; therefore, each will see the time differently at the same moment, the readings being both fast and slow during each half hour. The reason for this is apparent from Fig. 67, which shows two operators reading the time from one clock dial, the latter being in the reader's direct line of vision. When the minute hand is at the top of the dial, operator *A* will read the time fast and operator *C* slow, while with the minute hand at the bottom of the dial these conditions will be reversed, and *A* will read the time slow and *C* fast. If the clock is above the operator's line of vision, the time will appear fast to all of the operators when the minute hand is on the IX. part of the dial, and slow when the minute hand is on the III. part of the dial. Furthermore at all other points on the dial the error of vision is a constantly varying quantity, depending on the angle of vision.

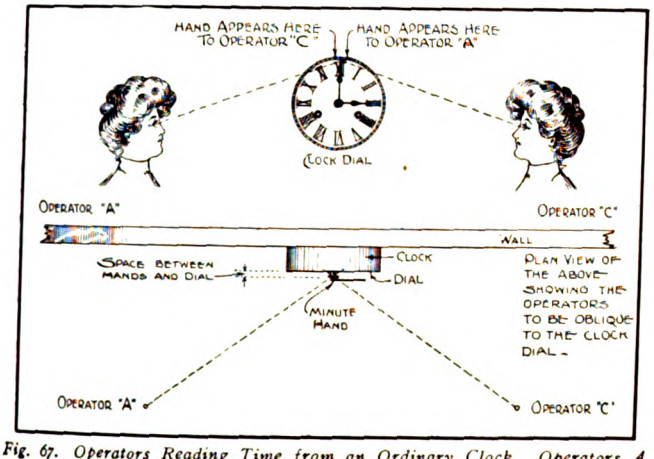

Fig. 67. Operators Reading Time from an Ordinary Clock. Operators A and C, Not Being in Direct Line, Read the Time Incorrectly.

A clock placed in the line of the switchboard sections will eliminate a part of these errors, but it is awkward for the operators to see the time. Individual clocks placed directly in front of each operator, with the center of the dial in the direct line of vision, gives the best arrangement with this method. Operators usually disregard all fractional parts of a minute, unless the clock is provided with a second hand, which is very seldom the case. Thus a chance is introduced for irregularities in timing. During rush hours it is physically impossible for the operator to read the time and record the same without personal errors, and either the patron or the telephone company will suffer. In all probability it will be the latter, as the operator soon learns from experience that it is easier for her to be on the safe side and under-estimate the time, than bother with complaints from patrons.

Time Stamps: Personal errors, due to both vision and memory, are obviated by the use of time stamps. The simpler forms are not adapted for toll service on account of their mechanical defects, and unless they are especially designed to meet the exacting requirements will prove a great injury to the service. Practically all of the commercial forms of time stamps are designed for other purposes and are operated by striking a blow of considerable force so as to obtain a clear impression. It is easy to see that the noise and jar caused by operating several of these stamps on a toll switchboard would greatly interfere with its operation. If, however, the stamps are each mounted on a solid pedestal, attached to the floor, so as to be in no way connected to the switchboard, this trouble is reduced.

A common form of time stamp has the figures of the printing

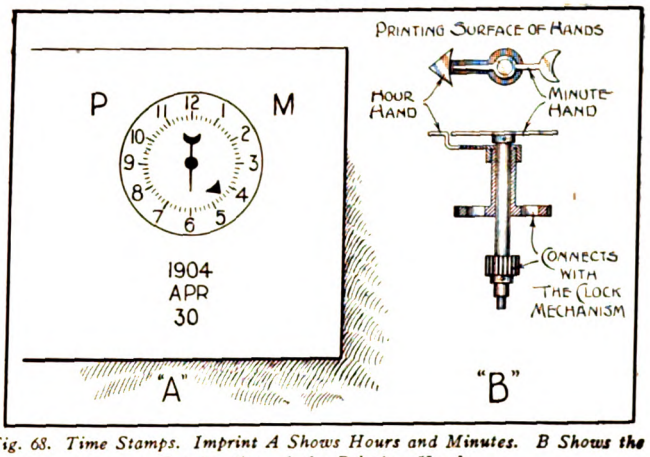

Fig. 68. Time Stamps. Imprint A Shows Hours and Minutes. B Shows the Construction of the Printing Hands.

dial arranged in a circle, similar to those in a watch dial, the pointers which indicate the hour and minute rotating in the center as shown at *A*, Fig. 68. In order that the dial and pointers may be printed at the same time, their tops or printing surfaces are in the same plane. This requires a special construction of the hands, shown at *B*, Fig. 68, so that they may pass each other without interfering. This brings the hour hand just within the circle of figures, and as only its end can print, it is made clearly visible by being formed in the shape of a large triangle. The minute pointer revolves twelve times to one revolution of the hour pointer, as in an ordinary clock, and for mechanical reasons it is made short, so that its point may pass the heel of the hour pointer. This brings the point of the minute indicator quite a distance from the minute divisions on the number circle, and makes the reading of the exact time difficult. The back-lash or play between the teeth of the clock gear wheels will allow the pointers to jump back or

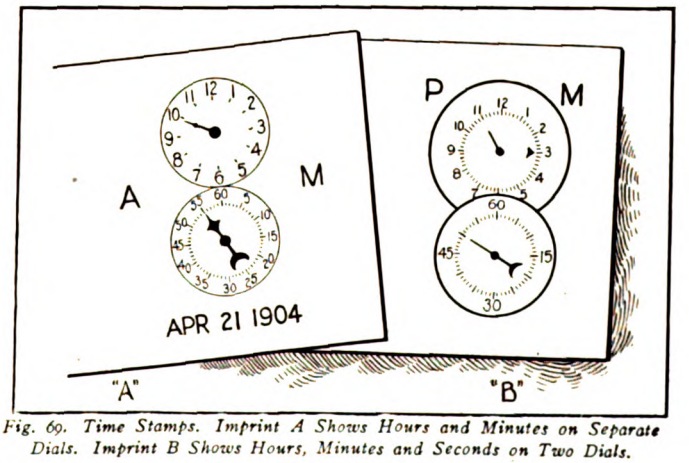

Fig. 69. Time Stamps. Imprint A Shows Hours and Minutes on Separate Dials. Imprint B Shows Hours, Minutes and Seconds on Two Dials.

forward when printing unless the mechanism is especially made. The errors due to these causes may be much more than one minute from the correct time, making this type of stamp useless for measuring small periods of time. Similar stamps are made with separate hour and minute dials and hands giving an imprint

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like *A*, Fig. 69. In this case it is not necessary for the minute hand to clear the hour pointer, and thus can be brought out close to the number circle, making the record easily read.

The imprint at *B*, Fig. 69, is from another type of double dial stamp, made for printing seconds in connection with a regular hour and minute dial. The hours and seconds are easily read, but the use of the short minute pointer, as previously described, makes this part of the imprint liable to error. Errors due to the great distance between the minute pointer and the minute divisions are done away with by a type of stamp using a revolving minute dial and a stationary pointer. Imprint *A*, Fig. 70, is from an instrument of this type, with a revolving dial divided into minutes, while *B* is from another stamp with the dials divided into minutes and quarter minutes. The latter has two revolving dials of large diameter, and for this reason only a small portion of them are printed. The legibility of the imprint, together with the ability to print fractional parts of the minutes, makes it especially suitable for toll timing.

A step-by-step time stamp with figures to indicate hours and minutes gives the most easily read impression of any time stamp record. In order that the figures may show in alignment at all times, the printing wheels are jumped forward at the end of each minute, giving an impression similar to *C*, Fig. 70. Fractional

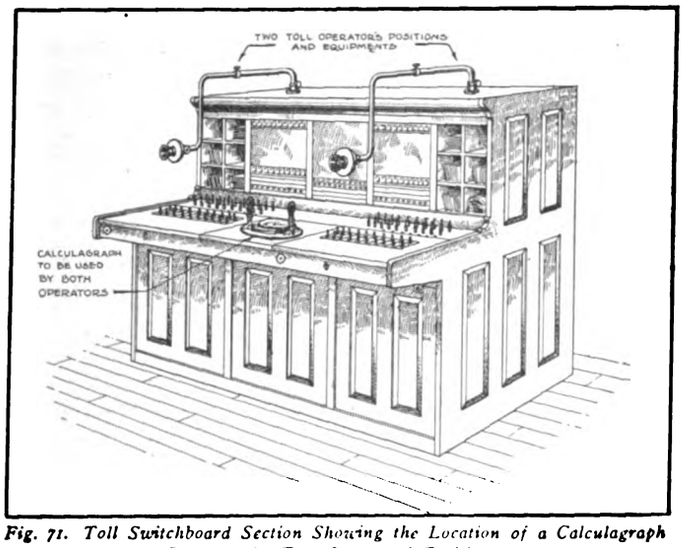

Fig. 71. Toll Switchboard Section Showing the Location of a Calculagraph Between the Two Operators' Positions.

parts of a minute cannot be recorded by this type of stamp, making it possible to show an error of 59 seconds, which for toll timing would be out of the question. Many other types of time printing stamps are made, but with all of them it is necessary to make a record at the commencement of the conversation, and subtract the two records in order to arrive at the elapsed time. This consumes valuable time, and there is still a possibility for personal error, but not to such a great extent as in the clock method of toll timing.

STOP WATCHES: Probably the first means of measuring elapsed time direct, without calculation, which would present itself to those uninitiated into the mysteries of toll timing, is the regular stop-watch. As only one message can be timed by the stop-watch at one time, it is obvious that several watches must be used by each operator, at least one for each toll line, so that there will be no interference if all of the circuits were busy—a not uncommon case, even at unimportant stations. The keeping track of so many timepieces, their proper manipulation and the recording of the results on toll tickets, makes the use of stop-watches a burden rather than an assistance.

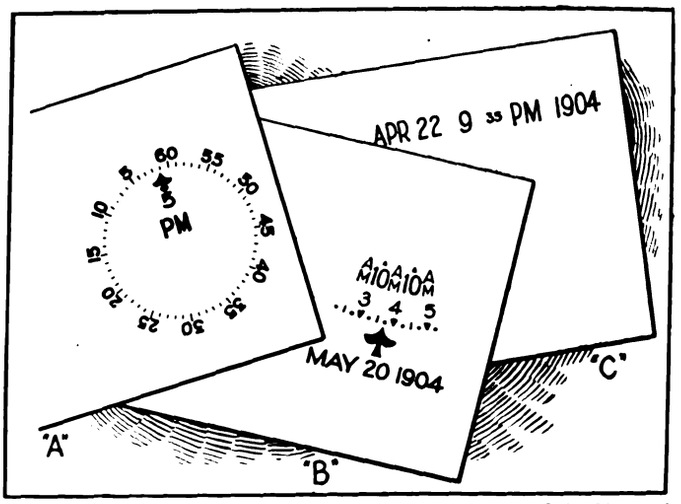

Fig. 70. Time Stamps. Imprint A Shows Hours and Minutes by Means of Movable Dials. Imprint B Shows Hours, Minutes and Quarter Minutes by Means of Movable Dials.

CALCULAGRAPH: There is an instrument made especially for timing toll messages which prints the elapsed time direct without any mental effort on the part of the operator, other than to stamp the ticket at the commencement and finish of the conversation. This instrument is known as the calculagraph. In its operation it mechanically subtracts the time of connection from the time of disconnection and prints the actual number of minutes and quarter minutes that elapse during the interval. As a single calculagraph will make such records for a large volume of business, without reference to the consecutive order in which they are taken, it is customary to place the instrument so as to be available for the use of two operators. In fact, the modern two-position toll sections are now made similar to that shown in Fig. 71, with a space in the center of the key shelf, between the two operators, for a calculagraph or other timing device.

A calculagraph record printed on a standard toll ticket is shown in Fig. 72. The imprint on the right hand side of the vertical dividing line is the time the parties were connected for talking, or the time of day. The triangular shaped pointer, indicating the hour, revolves around outside the circle of figures, while the minute pointer is in the center, so that its point is adjacent to the minute divisions. This gives a somewhat clearer imprint than the one shown at *A*, Fig. 68. There are two elapsed time dials, the one at the left hand side having a total of five minutes divided into quarter minute periods, the other a total of one hour divided into periods of five minutes each. The pointer on the latter dial passes from one space to the next during the time of an entire revolution by the left hand pointer. Thus the even periods of five minutes each are read on the middle dial, and fractional parts of such periods, down to quarter minutes, are read on the left hand dial.

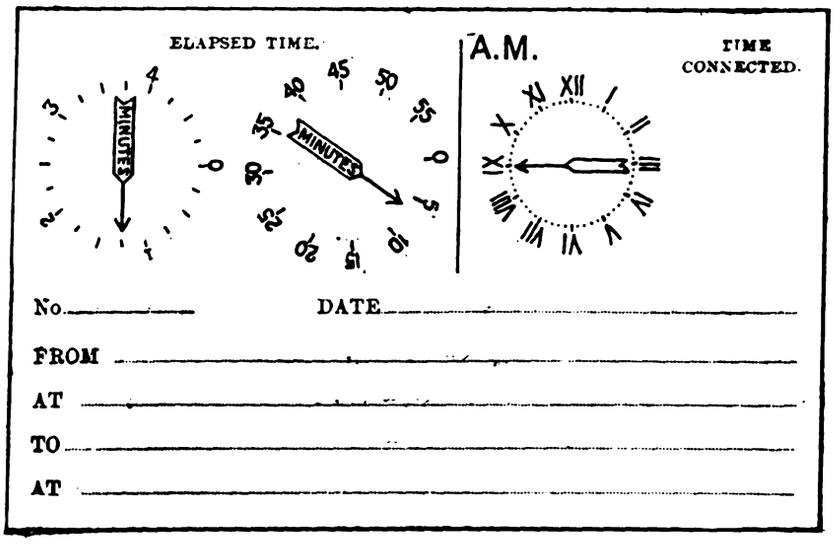

Fig. 72. Full Size Toll Ticket Showing a Calculagraph Imprint. The Record Shows that 6¼ Minutes Elapsed During a Conversation Which Started at 9:45 A. M.

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The printing mechanism of the center dial of the calculagraph is shown in Fig. 73. A pointer die, *a*, is permanently mounted at the top of a shaft, *b*, so as to revolve with the clock mechanism. This shaft can be forced upward by a forward movement of the handle, *L*, and will then print an impression of the arrow-shaped pointer on a card, if inserted between the inking ribbon and

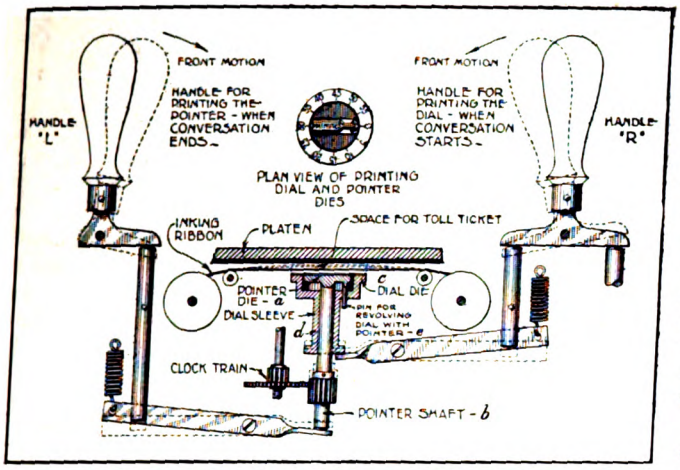

Fig. 73. Calculagraph Mechanism, Showing One Elapsed Time Dial and Pointer.

platen, as shown at *e*, Fig. 74. A dial die, *c*, with a sleeve-shaped stem, *d*, is mounted on the pointer shaft, *b*, so as to revolve with it. This stem can be forced upward, without lifting the pointer shaft, by a forward movement of the handle, *R*, and will make an imprint same as shown at *C*, Fig. 74. The dial and pointer are made to revolve together by a connecting pin, *e*, thus causing the arrow to always point to the zero mark on the dial. Either the dial die or pointer die can be forced upward so as to print without causing the other to lift and make an impression.

If both levers, *R* and *L*, were pulled forward at the same moment, the resulting impression on a ticket, placed in the printing slot, will show the arrow pointing to the zero mark on the dial. But in practice the records are not made in this manner. The dial is printed at the commencing of a conversation, and the arrow at the finish. During the interval both have moved forward and the arrow when printed will point toward figures on the ticket, which express the length of the interval—the elapsed time. The other dials and pointers are similar in construction and operation.

The method of operating the calculagraph is shown in Fig. 75.

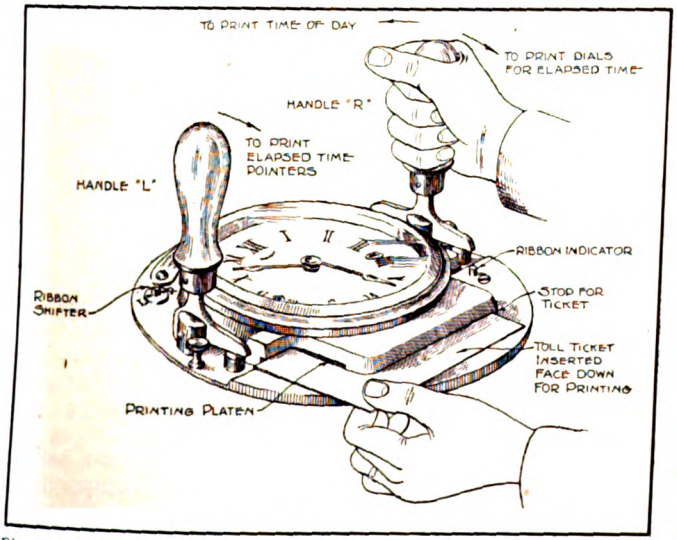

Fig. 75. Operating the Calculagraph. A Toll Ticket is Inserted for Receiving the First Imprint.

At the beginning of a toll conversation a ticket is inserted face down in the slot at the front of the instrument, with the top edge and the end of the ticket against the guide and stop. The right hand lever, *R*, is then pushed backward, and immediately pulled forward, the motion in both directions being to the limit of the movement. The backward movement of the handle gives an impression upon the right hand of the ticket, like *a*, Fig. 74, which will show the time of day the talk commenced. The forward movement of the handle gives an impression on the left of the ticket of two circles of figures, as shown at *b* and *c*. (The records shown in Fig. 74 are separated and made on different cards so as to clearly illustrate each movement of the levers.) As soon as the first imprints are made the ticket is removed from the slot so that records of other toll conversations may be started on other tickets in like manner. When any of the talking parties have finished, the card for that conversation is immediately inserted in the ticket slot, in the same manner and position as before, and the left hand lever, *L*, Fig. 75, pulled forward. This will imprint on the card two arrow-shaped pointers, same as those shown at *d* and *e*, Fig. 74. In the present case, however, they will appear in the center of the two circles of figures, which were previously printed at the commencement of the conversation, and will point toward the figures and division marks on the ticket which represent the number of minutes and quarter minutes of time which has elapsed during the conversation. See Fig. 72.

The calculagraph performs its work with practically no noise or jar and thus does not interfere with the operating of the switchboard. This is made possible by the method of connecting the printing mechanism to the time-keeping part of the instrument, which allows the printing to be done by a steady movement

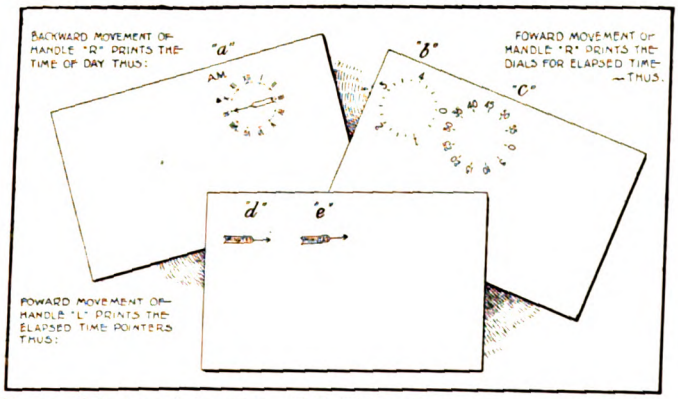

Fig. 74. Calculagraph Imprints. Each Ticket Shows a Separate Movement of the Handles.

of the handle instead of a violent stroke as on the ordinary form of printing stamp. If these two parts were rigidly fastened together the clock would be retarded each time an imprint was made by the contact of the dial and hands against the printing ribbon. In the calculagraph a certain amount of free movement is allowed between these parts so that the clock continues undisturbed while printing, and the dials and pointers are restored to normal by retaining springs, when the handle is released.

The question of the length of initial period to allow for conversations before commencing to charge overtime, and the details regarding the handling of the toll business, are topics which depend on the condition and environment of the telephone company. It is enough to say that it is only right to the user of the long distance service that his conversations are timed accurately and recorded without error so that no dispute can arise, or even doubt in his mind that he has been unjustly overtimed.

HUNTINGTON ENTERS INDEPENDENT FIELD.

IT is learned upon good authority that H. E. Huntington, who has within the past few days resigned as vice-president of the Southern Pacific Railroad, will hereafter devote himself to developing the Independent telephone system which he has recently organized in the Southwest. The new organization involves several million dollars, which it is understood has been subscribed in New York City. Already Huntington interests have secured control of many of the most important independent local exchanges in Texas, Louisiana, Arkansas, Indian Territory and Oklahoma.

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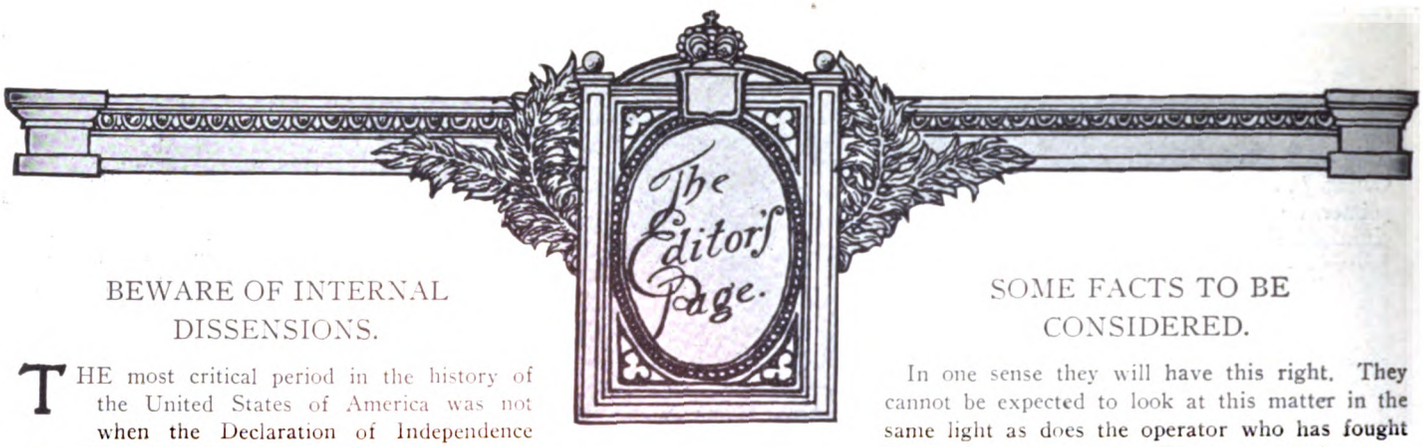

BEWARE OF INTERNAL DISSENSIONS.

THE most critical period in the history of the United States of America was not when the Declaration of Independence was promulgated one hundred and twenty-eight years ago. The real test came after this independence had been established and recognized by Great Britain. The real danger came from dissensions within, immediately after the treaty of peace, rather than from foes without. So it is with the independence of telephony. Now is the critical period; now, when independence has been won by dint of hard strife; when Independent telephony seems to have been established beyond all question, and beyond even the dreams of the first hardy spirits who ventured into this field of endeavor in opposition to a great and powerful monopoly.

What, then, is the real danger which confronts Independent telephony to-day, now that victory has been won? THE AMERICAN TELEPHONE JOURNAL wishes to emphasize the fact that this danger is not altogether from foes without, but from internal dissensions and misunderstanding. If the Independent telephone business is going to continue a success and to endure, those engaged actively in it, particularly those who are operating large systems and exchanges, must respect the territorial rights of others. There must be no clashing of Independent interests in any given territory.

In this connection the action of the New York State Independent Telephone Association, at its meeting in Buffalo, June 24, is prophetic of great things. This action took the form of the following resolution:

"Be it resolved, that it is the sense of the New York State Independent Telephone Association that the territorial rights of any and all accredited Independent telephone companies, toll lines or exchanges, shall be scrupulously respected, and that no Independent telephone company shall encroach upon the territorial rights of any Independent telephone company operating an *efficient and comprehensive* telephone service."

This is not sentiment; it is business, and must appeal to business men everywhere. The fundamental basis for the security and progress of the Independent telephone business, for the future, lies absolutely in the strict enforcement of this resolution, just adopted by the New York State Independent Telephone Association.

So far, there have been but few attempts made on the part of Independent companies to encroach upon territory properly occupied by other real Independent companies. There was little danger of this during the years of revolution. But now that the period of experiment has passed and it has been demonstrated over and over again that a properly conducted Independent telephone company is a financial success, is the time to guard against the dangers from within our ranks. Let us beware of encroachments and dissensions. While THE AMERICAN TELEPHONE JOURNAL believes that Independent telephone men will handle the situation just as carefully as did our forefathers during the period immediately following the American Revolution, still it behooves us all to be up and doing. We cannot sit down idly, shut our eyes and trust to luck to carry us safely through these difficulties.

As the business grows and as the financial success of the different organizations is advertised, there will spring up a feeling in men, possibly not yet interested in the Independent field, that there are opportunities for them in this business. They will feel that they have a perfect right and liberty to go into any attractive telephone field and begin the development of a telephone business, without regard to the fact that such fields have been occupied and developed for some length of time by another Independent telephone company.

SOME FACTS TO BE CONSIDERED.

In one sense they will have this right. They cannot be expected to look at this matter in the same light as does the operator who has fought for this supremacy. Time spent in condemning such investors is time wasted. The business of existing Independent companies is to see that these things do not take place; that a field already properly covered is not invaded by another competing Independent company. If this can be done, all will be well with the Independent telephone business. But the moment a precedent is established by one company competing in the Independent field with another Independent company, particularly if this precedent is established by a strong Independent organization, just then the Independent telephone business will be face to face with the most serious crisis in its history.

The truth of this requires no demonstration. It is axiomatic. Independent companies will have their hands sufficiently occupied in competing successfully with the Bell companies, all of whose allied interests are controlled by one central organization with the perfection of harmony.

Unless the Independent telephone companies now in existence can agree among themselves that they will not connect with, or do business in any manner, with any telephone company that infringes on the territorial rights of any other Independent company, whether it be toll line or exchange, then there can be absolutely no assurance to the present companies that their territorial rights, which they have striven so hard to develop and protect, will be regarded, and that they will retain the possession of the territory which they are properly taking care of.

Without this assurance Independent telephony cannot endure. Just as after the critical period following the Revolution the colonies got together on a basis which regarded the rights of all, so Independent companies must get together, not as one great centralized corporation, but with an absolute understanding which shall guarantee the rights of each. The New York Association has taken the proper course and one which will go far toward solving the problem. For the Independent companies themselves possess the remedy; it is only necessary to apply it. Each telephone company and each State association should adopt similar resolutions as this one adopted in New York. Each should regard the territory occupied by an active and *real* Independent telephone company as sacred to that company's uses as if it had acquired that territory by real estate purchase. Then the present companies can go before their stockholders and give them every assurance that the territory they are now developing and the business they are now securing will be theirs absolutely, so far as other Independent companies are concerned, just as long as they properly take care of it.

THE AMERICAN TELEPHONE JOURNAL uses the words "*real* Independent telephone company" in the above sentence. It does so advisedly. It is aware that there are a few alleged "Independent" companies promoted by the Bell interests that have sought to harass *real* Independents along the lines of this editorial. The Federal Telephone Company of Pennsylvania might be mentioned. There are a few others throughout the country, but they have no strength whatsoever, and their schemes are patent to the public. This paper rejoices when such concerns suffer at the hands of Independent companies. We mean only Independent companies in the broadest sense of the word.

Here, then, is the test. Independent telephony has fought a great fight with monopoly and has won the victory. Now is the critical period. Let existing companies rise to the occasion, that their hard-won victory may be permanent.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

DAMAGES FOR INTERFERENCE BY CONDUCTION.

A telephone company has been successfully operating grounded farmers' telephone lines for a period of five years. An interurban electric railway is constructed, which renders the successful operation of these lines impossible, and necessitates the reconstructing of them at considerable expense. Is the railway company liable to the telephone company for damages?

L. C. Telephone Co.

YOU do not state in what way the electric railway interferes with the operation of your telephone company, so that I will assume, for the purpose of answering your question, that the interference was by conduction. The rule in such cases is that for injuries caused by conduction, due to more powerful currents used by an electric railway company, there can be no recovery by another electrical company, whose wires are grounded upon the highways. And, though its wires may be grounded upon private property, yet if directly connected with its use of the public highway, and a part of its system in such use, there can be no recovery from the railway company. A different rule, however, is said to prevail in case the telephone company has constructed its lines upon private property, and the highway was not affected by the operation of its system. In such a case, if the lines were so affected by conduction as to prevent their operation or the successful transaction of the business of the company, there would probably be held to be such an appropriation of private property as would require compensation to be made. Joyce on Electric Law, Section 510.

TWO COMPANIES ON SAME SIDE OF STREET.

A TELEPHONE company cannot assert an exclusive franchise to occupy the streets of a city with its poles and wires, as against another telephone company obtaining the same right from the city authorities. This was the ruling of the Supreme Court of Alabama in the case of the American Telephone & Telegraph Company against the Morgan County Telephone Company, in which the former company sought an injunction against the latter company, to restrain it from the erection of its telephone line and the operation of its telephone system.

The facts of the case were that the complainant company has a franchise from the town of New Decatur, Ala., in pursuance of which it constructed its line along the highways of the town and operated its telephone system therein. The construction was performed under the supervision of the street committee of the town. Later the defendant obtained a similar franchise and began, without the consent of the complainant, to construct its lines along the same side of the streets in said city that complainant's poles occupied, digging holes for its poles between the poles of complainant. . The answer of the defendant to the bill of complaint showed that its poles were of sufficient height to enable defendant to string its wires so as not to interfere by contact with complaininat's or act as conductors of electricity from them. Defendant's poles were set in the ground six feet and braced as well as possible. Any contact with complainant's wires during the process of erection would be of a temporary character. It appeared that scientific appliances for insulation would be provided, which would prevent defendant's wires from acting as conductors of electricity from those of complainant, except possibly from accidents from winds or storms.

The contention on the part of the complainant was that without its consent the defendant had no right to erect its poles on the same side of the street with it between the poles of the complainant and to string its wires on or near the tops of these poles above the wires of complainant; while that of the defendant was, conceding the equal right to the complainant with itself to the use of the streets of the city for its telephone purposes, that complainant had no right to said streets superior to the right of the defendant so long as defendant did not in some serious and permanently injurious manner interfere with the complainant's rights.

The court held that the rights of each company were equal, the principle being well settled that no company can, under ordinary circumstances, assert a right to the exclusive enjoyment of a city's streets. The two companies were regarded by the court as in the legal attitude of using, in a sense, their own property, the obligation of each being to so use its own property as to do no unnecessary injury to that of another; and for any default in that particular, the negligent party being liable to the other in an action for damages. The court accordingly held that the complainant had not presented such a case of pressing necessity as authorized intereference by injunction.

Much of the defendant's answer set up facts tending to show that the purpose of complainant was to maintain a monopoly of telephoning in the city and to exclude defendant therefrom. These matters the court considered as not directly responsive to the averments of the bill, when considered as one for present injunctive relief. American Telephone & Telegraph Co. v. Morgan County Telephone Co., (Ala.) 36 S. 178.

PUNITIVE DAMAGES FOR TRESPASS.

"IF trespass upon the plaintiff's land by the telephone company was done in a high-handed, malicious, and oppressive manner, he can recover punitive or exemplary damages." So ruled the Supreme Court of Kentucky in a recent case. The petition alleged a trespass by digging holes and erecting telephone poles on defendant's land, the wrongs being done over plaintiff's protest, and being forcibly and maliciously committed. The answer failed to deny the ownership and possession, or the digging of the holes, or the erection of the poles, but merely denied that the trespass had been committed in an aggravated manner. The evidence showed the commission of the alleged trespass, by defendant's servants, who entered on plaintiff's land without pretending to know to whom it belonged, and committed the acts in plaintiff's presence, and despite his protest. The court held that the plaintiff was entitled to a peremptory instruction for the actual damage done to his property. Jones vs. Cumberland Tel. & Teleg. Co. (Ky.), 80 S. W., 165.

SERVED HIM RIGHT.

F. M. MOSSMAN, of Whitely County, Ind., is defendant in a very peculiar case. He protested against the erection of a telephone line in front of his home. He began by ordering the men who came to dig the post holes to leave the place. They dug the holes and he as quickly filled them in. The next gang of men succeeded in erecting the poles; these he pulled up and carried into his barnyard. They were replaced, and he next sawed them down; then he took an ax and cut the wires into short bits and split the poles. The president of the Whitely Telephone Company called upon him and told him that if he would refrain from molesting their property no prosecution would follow. Mossman declared: "As long as God gives me strength I will cut down the poles as fast as they are erected." He was arrested, fined $5 and costs, and given thirty days in jail, from which decision he took an appeal.

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THE DEADHEAD IN THE TELEPHONE SERVICE*

By H. D. Stroud.

THE idea would be characterized as absurd if it were proposed for a railroad company to issue a ticket, for a stipulated sum per annum, which would give to the holder the privilege of unlimited travel, the ticket being transferable so that it could be always in use. This policy, if carried out to its ultimate end, would result in crowded trains and more of them; more tracks would be necessary to handle the traffic. The people who really needed to travel and who paid for the privilege of so doing would often be crowded out, or at least inconvenienced, by the multitude of *railroad deadheads* who were traveling simply because it cost them nothing and they had nothing better to do. From the standpoint of the railroad companies it would be no less disastrous because they would be required to give unlimited service for a fixed charge.

Absurd as this idea seems it is exactly what the telephone companies of the present day are doing, in the great majority of cases. For a certain fixed charge per annum they grant the privilege of a telephone line not only to the person who pays the bill, but to anyone who wishes to avail himself of free service. The result in the case of the telephone company is worse in some respect than in the case of the railroad cited. A crowded railway train is always susceptible to a little more crowding; people hang on to the straps and out of the windows, and, if necessary, get on the roofs of the cars. When, however, a telephone line is in use for no matter what purpose, all others than the user at that moment are compelled to wait.

The matter is susceptible of analysis. Actual figures show that the number of calls made per day in the average city is such as to indicate that 50 per cent. of the population find occasion to make a telephone call at least once a day. As against this it may be stated that the proportion of telephones in service to the population, in the average city or town, is about one telephone to 40 people. This high percentage of users as compared to the telephones in service indicates that a large percentage of the calls are made by people other than those who subscribe to the telephone service; that is, by people who pay the telephone company no revenue at all.

This great army of unprofitable—or, more properly, *profit-reducing*—telephone users is composed of people in almost every station of life. The lady of leisure who asks her druggist or grocer to send a message to her husband down town; the young lady stenographer who calls her "friend" during office hours and holds the wire for half an hour, keeping her employer's line busy, and possibly incurring a greater loss to him than if he had given her a half day off to attend to her social affairs; and the party next door who uses the telephone as much as the person who pays the bill. These are but a few of that class of humanity known as the *telephone deadhead.*

The telephone subscriber under the flat-rate plan is, under ordinary conditions, the victim of gross injustice. He pays for the service of the telephone line, of which he is supposed to have exclusive use. If he is a business man he finds that his telephone is kept unnecessarily busy on trivial matters, either by the use of the telephone for other than his own business, perhaps by outsiders who *may be* civil enough to ask it as a favor. He not only finds that he cannot use the line when he wants to, but, what is worse, that his customers or clients are not able to reach him without undue trouble, and that business which might come to him may be forced elsewhere.

The telephone is a doorway through which more business may enter than comes in through the door left by the architect. It is as unprofitable to block this telephonic doorway with needless outgoing traffic as it would be to block up the architectural door with outgoing shipments in such manner as to prevent customers from entering.

The deleterious effects of the deadhead are not so directly traceable with respect to incoming traffic, but are nevertheless present. A line is *just as busy* when rendered so by *incoming* traffic as by *outgoing.* And it is within the power of people on the outside, with nothing else to do, to keep a man's line busy on trivial and therefore unprofitable affairs. Telephones will be used for making such calls unless some method can be put into effect for preventing the trivial and indiscriminate use of the telephone.

Such a method applied to any one telephone would prevent in large measure such annoyances due to outgoing traffic on that particular line; but this telephone is subject to incoming calls from any other telephone and therefore in order to attain a complete remedy for these evils the method adopted for its relief must be generally applied—applied to many telephones instead of to one only.

In large cities the deadhead call has become such a nuisance that it is used as a serious argument by the proprietors of many stores and offices against installing telephones at all. This is always the case in railway depots and public places where unlimited service is used, while in small towns where people are more familiar with their neighbors than in large cities it is even more of a nuisance in this respect.

On party lines the various objections to flat-rate service are present to an even greater extent. Owing to the trivial and needless use of the line by parties at other stations a subscriber is often compelled to wait hours for the transaction of some really important business.

If the present method of charging is objectionable from the standpoint of the subscriber it comes near being a positive calamity to the operating company. The rates that were established a few years ago on a scale calculated to give the operating company a reasonable profit are becoming too low. This is due not only to the fact that the number of subscribers is increasing and therefore the cost for giving service to the subscriber is increasing, but also to the fact that the traffic has increased enormously on account of the various reasons already mentioned.

The cost of giving telephone service, other things being equal, depends on the traffic. As a rule, the operating companies are not able to raise their flat rate charges, due either to the sentiment of the public or to the fact that in many cases the actual franchises, under which the telephone companies gained existence and operate, limit the rate charged for unlimited service to that in actual effect.

How does the amount of traffic influence the cost of giving service? First, increased traffic means that a smaller number of lines on an average may be handled by an operator and therefore more operators are required; more operators means a larger pay roll. Second, the fact that a greater number of operators are required means a greater number of positions at the switchboard; it means that the jacks must be multiplied through a greater number of sections than would otherwise be the case. The cost of the switchboard is therefore made greater and this means that there is a larger item for interest and depreciation with increased traffic. Third, a greater number of sections required on the switchboard makes necessary more floor space, which means more rent, or its equivalent—more interest on the investment in the building, where the building is owned. Fourth, the greater number of switchboard sections and the increased number of wires means more light, more current for operators' transmitters, and therefore greater miscellaneous expenses. Lastly, apparatus that is much used will wear out more rapidly than that which is less used, therefore with increased traffic not only is depreciation greater but the cost of maintenance is higher.

What is the remedy? Is it not to be found in general along the line of increased rates. The public, as a rule, will not stand with good grace for a rise in rates and even if this were not the case the franchise is often of such a nature as to prohibit it. Obviously,

*Extract from a pamphlet issued by the Controller Company of America.

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therefore, if the rates cannot be raised and the exchange is being managed as economically as possible for the amount of traffic being handled, the only remedy is to reduce the traffic and the only way to reduce the traffic is to cut out the deadhead, and thereby the unwarranted and wasteful use of service.

From the above an unalterable conclusion may be reached that in any form of public service the flat rate of charge for unlimited service is abnormal, inequitable and unjust, proving a burden alike to the operating company and to that portion of the general public which pays the bills.

The stock argument of those telephone companies using unlimited service is that they are in the telephone business to give their patrons all the service they want for the price they fix. It is reasonable to say that this policy cannot long continue. This is true, if for no other reason, because it is not in accord with good business principles. It might prove profitable to the telephone company if a sufficiently high rate could be secured from a few subscribers to pay for the entire operation and maintenance of the exchange as was the old-time Bell policy. What subscriber, however, wishes to pay for the deadhead business when he learns that there is a reasonable way to make everyone pay his proper share for the telephone service received? Deadhead calls are unprofitable both to the operating company and to the telephone subscribers. The deadhead borrows telephone service, so to speak, but he borrows that which he has no means of paying back. The cost of operating and of maintenance and the expense necessary to supply switchboards, cables and wires is greater per telephone where the service is used indiscriminately; the percentage of unsuccessful calls, due to the line called for being busy, is in direct proportion to the traffic, and the telephones and parts of the switchboard have a life in proportion to the traffic as well.

Any plan which will result in a material increase of the revenue from subscribers and at the same time a material reduction in the cost of operating as well as of interest, depreciation and rent is worthy of serious consideration.

We have seen electric light sold on the unlimited flat rate plan in the early days of electric lighting business, but now, even in small towns the electric light and gas companies have made large outlays of capital in the introduction of meters and like appliances so as to measure the service rendered and make the charge accordingly. As a result, these companies have found that they can supply more customers on this basis with a given outlay of capital, or, in other words, without increasing the size of their generating plant they can serve more customers, giving each as much light as he chooses to pay for and preventing the waste of light which is sure to occur when the user's pocketbook is not affected thereby. In the electric light business, therefore, the force of the whole matter is that measured service prevents waste. No sensible person will deny these facts.

As in the electric light business so in the gas business, the railroad business in general and all other forms of public-serving enterprises, excepting the telephone business, some means of compelling the user to pay for what he gets has been adopted in order to prevent the waste which would otherwise have proved the ruin of the operating companies. It seems strange, therefore, but it is nevertheless true, that the telephone business, in which the waste of service is not only ruinous to the companies but detrimental to the interests of the customers, should be the last to succumb to this rational plan of working. That it is a rational plan and that the telephone people throughout the world are coming to it rapidly no sensible person who is a student of conditions can doubt.

The way then to down the deadhead imp is to measure the amount of telephone service as a basis of the charge for such service. That this is true is proved not only by the arguments advanced above but also from actual facts gathered from conditions existing in those cities whch have adopted measured service in large degree.

A good example is found in one large telephone system using something over 50,000 nickel pay stations. In this there is given, besides individual line service, two-party line selective service, four-party line selective service, and ten-party line non-selective service. In this system the ten-party line traffic is but little heavier than that of the average individual line in the same district on the flat rate plan. This is because a nickel must be paid at the time the telephone is used. The average income on the ten-party line service is about $3.50 per telephone per month. In public places, such as drug stores, depots, hotel lobbies, etc., a special size of cash box holding $32 in nickels became necessary and some of these require collection twice a week because the capacity of the box is not sufficient to hold the week's deposit. It is not unusual in a city to find telephones averaging $5 per day. These figures are facts, not fancies. So much for the possibilities of measured service.

Probably the ideal telephone system is one where a charge is made for the installation of the telephone, and then a given charge per call, and, where it seems advisable, a small guaranteed use of the service on the part of the subscriber may be required, varying from one to five nickels per day, according to the parties on the line. Party-line service on this plan is free from the objections offered to it on the free-for-all way of selling service for the very reason that measured service lightens the traffic. Looking at this from the standpoint of the operating company more parties may be placed on the same line without overloading the line. From the standpoint of the subscriber, the number of parties on a line being the same, the traffic is so greatly reduced that he is seldom aware that other parties share the use of his line.

Under the measured service plan the deadhead becomes a live one, the unwarranted and frivolous use of the service is obviated, the small merchant or the man of small business affairs may have telephone service within the reach of his purse and just as adaptable to his needs as is unlimited service to the man who is able to pay for it.

The telephone deadhead is the greatest enemy of good telephone service. Like a leech he is slowly but surely sapping the strength of what would otherwise be strong, energetic organizations. The deadhead is the sworn enemy of the dividend.

THE TELEPHONE SITUATION IN MANILA.

SEVERAL attempts have been made to secure a franchise for an American company to operate a telephone system in Manila, but so far without avail. There are several reasons which tend to prevent the spending of any large amount of money to better the execrable service that is given by the present company. In the first place, the cost of installation is very high; and American or good Spanish operators would require high wages to enable them to live and work respectably. So far the Government has not made any concessions that would allow a reputable company to engage in business.

Under a practically exclusive franchise from the Spanish Government, which must be respected, the present company can retain its privileges eight years longer, the only condition being that a "satisfactory and proper service be maintained during that time." It is easy to conjecture that this satisfactory and proper service will not be an improvement over the telephone conditions that exist at the present. The apparatus in use is antiquated, consisting of the earliest types of Ericsson and Spanish inventions.

The district covered by the present exchange is called the "red telephonica," or telephone network, and is maintained by native and half breed employees. An instance of the service that is given is herewith described, which may be of interest. An American gentleman wished to call up a party on an important business matter, demanding immediate attention. For fully half an hour he rang steadily, until some friends happened to come in. Asking one of the gentlemen to keep up a steady ringing, he jumped into his carriage and drove over to the exchange. In less than ten minutes his voice came over the wire, and in language not exactly parliamentary he told of finding the operator lying back in his chair reading a paper and smoking, with his feet on the table, one bare toe keeping the drop of the line up, while he used the other foot to replace any other drops that might fall. During the night the operators have the habit of grounding or opening a line that is at all likely to be busy; in fact, during the night hours the wires of the *Cablenews* and *American*, Manila's two principal daily newspapers, are frequently cut off for hours at a time.

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IN THE OPERATING FIELD.

TELEPHONE PAPERS TO BE READ AT ST. LOUIS.

WE are informed that at the International Electrical Congress to be held at St. Louis the following papers in Section G will be read:

Electric Communication. Chairman, Mr. F. W. Jones; Secretary, Mr. B. Gherardi.

"Electric Communication in Spain," Señor Don Julio Cevera Baviera.

"A New Danger to Lead-Covered Aerial Telephone Cables," John Hesketh.

"Simultaneous Telephony and Telegraphy," Herr Joseph Hollos.

"Telephony and Telegraphy in Japan," Saitaro Ci.

"Questions Connected with Rates and Management in a Telephone Exchange," G. de la Touanne.

"Telephony," Hammond V. Hayes.

"The Telephone Problem in Large Cities," Franz J. Dommerque.

"Features of Two-Strand Common Battery Systems," J. C. Kelsey.

"Problem. Automatic vs. Manual Telephone Exchange," Kempster B. Miller.

"Telephony," F. A. Pickernell.

"Military Use of the Telephone, Telegraph and Cable," Col. Samuel Reber.

"Electrolysis of Underground Conductors," Prof. George F. Sever.

"Economical Features in Modern Telephone Engineering," L. W. Stanton.

Up to June 23 1,776 applications to the Congress had been received and over 150 papers promised. Twelve of these papers have already been delivered. Arrangements are now being completed for printing papers in advance of the Congress, so that all that are received in sufficient time will be ready for circulation among the Congress members at St. Louis. Effors are being made to secure as many of the promised papers as possible in advance.

A PROGRESSIVE INDIANA COMPANY.

THE Richmond (Ind.) Home Telephone Company can boast of a larger proportion of subscribers than any other company in the United States with but two or three exceptions, having one telephone to every ten inhabitants. In round figures Richmond has a population of 20,000, and the Home Company has over 2,000 subscribers. This success is due to the business ability of the promoters and management as well as to the courteous treatment given to the public by its officers. The company has recently inaugurated an information service for the U. S. weather reports. Between 7 and 8 P. M. every evening all lines will be given the general signal, which consist of six short rings, and then the weather report for the next twenty-four hours will be read.

THE TELEPHONE SITUATION AT PANAMA.

THE telephone system in Panama is operated and owned by Ernesto Lefevre, under a concession that has still four years to run. The population of the town is in the neighborhood of 18,000, of these 60 per cent. are too poor to afford a telephone. At present there are about 75 subscribers, the rates being $4 silver, per month (exchange at rate of 110 per cent. for sterling). Colon, the town on the other side of the Isthmus, has a population of about 4,000. Communication, by means of the telephone between the two cities, is controlled by the railroad company. The average cost of telephone poles is about $10 silver, and the duty on telephone material 20 per cent. *ad valorem*.

SUCCESS OF THE CUYAHOGA PROFIT SHARING SCHEME.

IT is doubtful whether any other plan has ever been so successful in securing the co-operation of employees in the very best way as has the profit sharing scheme instituted by President Dickson, of the Cuyahoga Company, in Cleveland. To further promote the interests of the employees as well as those of the company, attractive mottoes have been painted upon the walls of the operating room. On one wall is a motto which reads: "This business is our business." On the next wall is the motto: "We all share in the profits." And on the third wall is this inscription: "Good service means good profits." Colonel Dickson is very much pleased so far with the results of this profit sharing scheme, and has a very loyal band of employees.

A POPULAR CHIEF OPERATOR.

IN a prize contest originated by the Louisville (Kentucky) *Times*, the chief operator, Miss Marie Yonkers, of the Louisville Home Telephone Company, is third on the list of the most popular business women of Louisville, New Albany and Jeffersonville. The first prize consists of a $400 Kurtzman piano and a $250 Pianola and $50 worth of music for the Pianola. The second prize is a $300 piano, and the third prize is $200 in gold. The value of the prizes has made the contest very exciting, there being upwards of 56 contestants to date.

EXPERIENCES OF AN AMERICAN TELEPHONE ENGINEER IN ABYSSINIA.

AT the present time there are nearly 800 miles of telephone wires in Abyssinia, and enough more are being stretched to bring the total length to nearly 1,800 miles by the end of this year if nothing happens to stop operations.

An American engineer who laid out many of the routes and helped to install the first few hundred miles of wire, under contract with the Abyssinian Minister Jig, who initiated most of these improvements, says:

"There wasn't a thing that weather, man or beast could do to us that wasn't done. Tremendous rainfalls were the first source of damage. The water would literally pour out of the sky, and when the 'shower' was ended we had the pleasure of going over miles of line and resetting poles that had been washed out of their places by young floods.

"Scarcely had we begun to erect the poles before we found that they were falling again, mysteriously, as it seemed. Then we saw that we were up against the termites. As soon as wood was placed into the ground they were at it. You can see acres and acres of land in parts of Abyssinia that are as well cropped as if some one had gone over them with a giant lawn mower. That is the work of termites.

"Immediately after discovering this we ceased to erect wooden poles and used iron ones. Then man began his work. The natives saw great uses for the beautiful round iron posts, and whenever we had moved on a few miles they would sneak up

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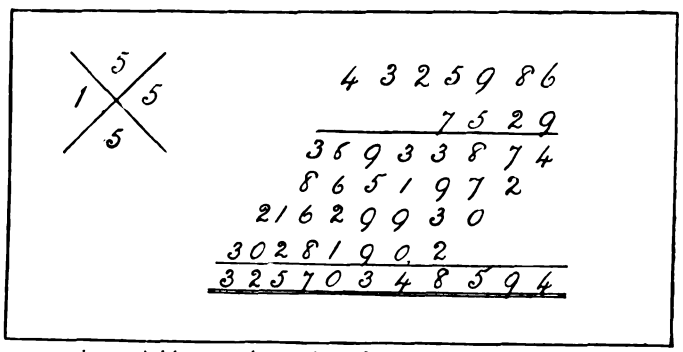
and tear them out. Finally King Menelik had to send messengers throughout the country proclaiming that extreme punishment awaited any who touched the telephone plant.

"Now that the wires are up and men leaving them alone, there is constant damage still. The monkeys of Abyssinia have discovered that they make magnificent trapeze wires, and they swing on them and play with them until they come down. The elephants, too, destroy a lot. They have found the iron posts very nice to lean against and to scratch their sides on, and as they were put in to support wires and not elephants, a few give way every day in the elephant regions.

"Inanimate nature also is at work continually to bother the telephone superintendents of Abyssinia. The jungle grows so fast that hardly a day passes in which it isn't necessary to send out a party to cut away some of it where it has reached to the wires. The worst trouble is from the huge creepers that grow over all the trees. They fall here and there all the time."

A MATHEMATICAL WRINKLE.

IT often occurs in the matter of making up estimates or accounts that multiplication sums of varied magnitude are involved, upon the correct result of which much depends. Since tables embracing large numbers are not always available, the following method of proof is suggested which is both simple and rapid. To the left of the sum draw a cross, as shown in the



example. Add together the figures of the multiplicand, divide by 9 and place the remainder, which is 1, to the left of the cross. Go through the same process with the multiplier, and place the remainder, 5, to the right of the cross. Then multiply the two figures on either side of the cross and divide by 9, placing the remainder at the top. In this case, the result, 5, cannot be divided, so it takes the place of the remainder. If the result is correct, then the remainder of its sum added together and divided by 9, must equal the figure at the top of the cross. There is only one possible point of error in this proof, and that is if the result of the multiplication should be 9 in excess or less than the correct amount the proof would be the same. The chances for such an error are remote and hardly worth considering. The space at the base of the cross is where the resultant of the last operation is placed, and indicates the correctness of the example.

UTICA HOME COMPANY'S IMPROVEMENTS.

A NUMBER of extensions and improvements are about to be made by the Utica (N. Y.) Home Telephone Company, among them the laying of 8,000 feet of underground cable. The company is equipping its switchboard so as to accommodate 800 additional subscribers, and in doing this work it will necessitate a large amount of work on the city lines, as well as the toll lines. Extensive construction work has been carried on at Cooperstown, Richfield Springs and other points in the company's territory. The Rome Independent Telephone Company is also getting ready to make several improvements. Two new sections to the switchboard will be made and 20,000 feet of aerial cable will be strung.

FREE TELEPHONE LINES IN INDIANA.

JOHN H. MURRAY, chairman of the board of commissioners of Jackson County, Indiana, is an advocate of free telephone lines, and says that the board of commissioners of Jackson County will build a free system of main telephone lines in that county, that the country youth may be encouraged to stay on the farm, instead of deserting it to go to the towns and cities to live.

Something must be done to bring this about, and free roads, free mail delivery and free telephone lines will all have a great tendency to do it. In fact, these conveniences, together with the interurban lines, make the county one vast town or city. Many farmers refuse to cultivate their land because they can not get farm hands, and this will have to be remedied some way. The question is—how? The telephone will help, says Commissioner Murray.

TELEPHONIC PRINTING.

M. MALCOTTI, an Italian engineer residing in Berlin, has invented an instrument which he calls a telecriptograph, which will reproduce in print all conversations held over the telephone. The young inventor claims that his instrument will work without extra wire and apparatus over any ordinary telephone line. Patents have been secured in several countries and in the United States, where he intends to install his service with the aid of some telephone company.

A NEW USE FOR THE TELEPHONE.

E. C. RIEGEL, formerly resident agent of the Ocean Accident & Guarantee Corporation, has instituted a new business enterprise in Cleveland which opens up new fields for the development of the telephone industry as applied to every day business. The system is called the Telagirl System, and has been evolved for the saving of time and expense to business men. The idea of the whole thing is to take charge of the stenographic work of various offices through the company's headquarters which maintains a staff of efficient stenographers. Telephones are installed without expense to the subscriber, connecting him with the company's headquarters which he can reach at any time. He is at once connected with a stenographer who takes his dictation either by notes or on the typewriter as preferred, using his personal stationery, which is of course kept on file. The finished work is then enclosed without folding in a large envelope, sealed and delivered at once by prompt messenger service. The monthly statements rendered to clients of the company are of particular value, as they are itemized in every detail, thus forming a valuable reference index of correspondence to the business man. The completest privacy is secured, each stenographer having a small room of her own so that messages can be repeated back to the client without being overheard by others.

SOME ARKANSAS RESOLUTIONS.

HOT SPRINGS, Arkansas, has two telephone systems, the Bell and Southern (Independent), and the way the city threw their support to the Southern Company is shown by the following resolutions, passed by a committee of the whole, representing the following organizations: The Retail Grocers' Association, 77 members; the Business Men's Mutual Association, 38 members; the Retail Druggists' Association, 20 members; the Retail Liquor Dealers' Association, 40 members, at a meeting held March 25, 1904:

Resolved, That our various organizations require but one telephone in their business houses and residences; that the service given us by the Bell Telephone Company has been unsatisfactory; therefore, be it further

Resolved, That on and after May 1, 1904, our respective organizations agree to discontinue the old telephone and use the new telephone exclusively. We shall use the telephone at the following rates: $2.75 per month for business telephone and $2 per month for residence telephone.

Resolved, That no matter what inducements shall be offered by competing companies, we shall confine ourselves to the new telephones so long as the service is satisfactory and the above prices maintained.

Resolved, That these resolutions shall not apply to the wholesale dealers belonging to the Retail Grocers' Association.

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TELEPHONE PATENTS

IMPROVED TELEPHONE LAMP JACK.

H. P. Clausen, of Chicago, Ill., patents (No. 762,279) and assigns to the American Electric Telephone Company an improved telephone lamp jack. The object of this invention, which is shown in the accompanying illustrations, is to provide a simple and inexpensive form of lamp jack which can be readily removed from the switchboard for repairs, easily inspected, provide an insurance against short circuiting of the terminals and arranged to prevent false signals. The inventor provides a base plate of metal, *A*, having its edges, *a*, *a'* and *a''*, upturned as shown. Upon

Fig. 1.

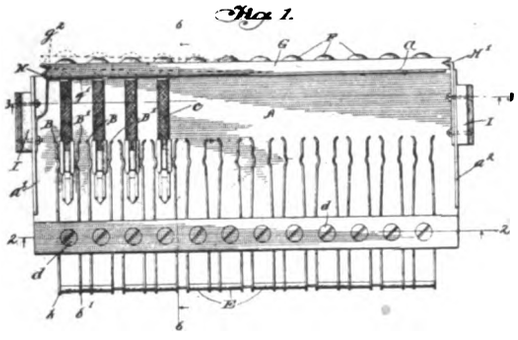
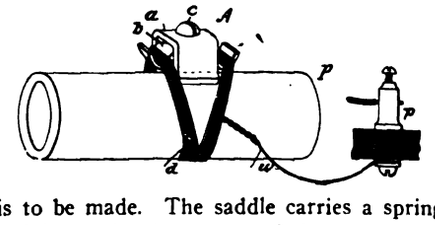


Fig. 2.

the rear of this base plate the strips *D* and *D'* are clamped by means of the screws, *d*. These strips support the springs which form the lamp jacks. The upturned edge, *a*, forms a backing for a strip, *G*, which is bored to hold the opals that form the lamp caps. The method of securing this strip is self-evident from the drawings. By means of the spring walls, *a* and *a'*, it is also evident that the strip can be easily removed for inspection. The portion of each lamp inside of the strip *G* is surrounded with a convenient opaque covering, which prevents the light of one lamp from shining into the opal of an adjacent one. By this means an exceedingly compact lamp jack is obtained.

IMPROVED GROUND WIRE CONNECTION.

J. J. O'Connell, of Chicago, Ill., patents (No. 762,341) an improved method of making a ground connection and assigns to the American Telephone and Telegraph Company. This device is shown in the accompanying illustration and consists of a saddle *a*, which is placed upon a pipe or other object to which a ground



connection is to be made. The saddle carries a spring *b*, which may be placed in tension by means of the screw *c*. A lashing of wire is placed in the u-shaped ends of the spring and around the pipe, then by tightening the screw *c* good electrical connection may be secured.

IMPROVED AUTOMATIC TELEPHONE SYSTEM.

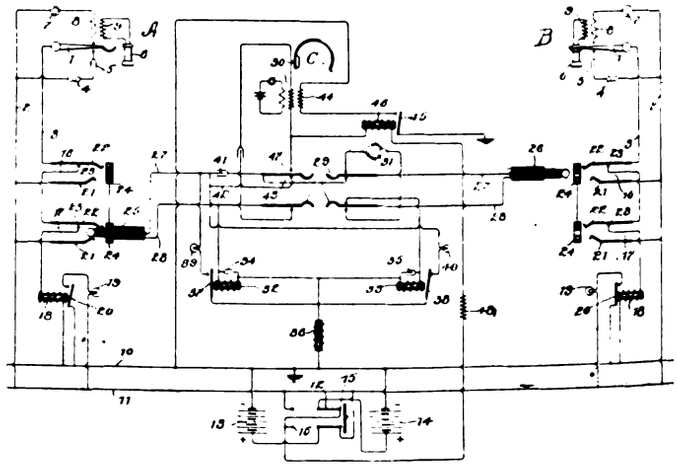
F. A. Lundquist, J. Erickson and C. J. Erickson, of Chicago, Ill. patent (No. 763,412) an improved automatic telephone system and assign to themselves, John Anderson, of Salina, Kansas, and Globe Automatic Telephone Company, of Chicago, Ill. This invention relates to an automatic telephone exchange to be used to make connections between subscribers operated by the subscribers themselves. The patent requires 10 sheets of drawings and 15 pages of specifications, and it is so intricate that it is impossible to condense even the essential features into the space limits. Those who are interested in this department of telephony are recommended to obtain the patents themselves.

SELECTIVE SIGNALLING SYSTEM.

G. Babcock, of Chicago, Ill., patents (No. 763,351) an improved selective signalling system and assigns to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y. This invention employs the familiar step by step mechanism, whereby a series of electrical impulses operate the contact wheels located at the various substations. The device is so complicated that it requires three pages of drawings and 28 pages of specifications to describe, and we advise those who are interested therein to obtain the original patent, as the description far transcends our limits.

TELEPHONE SYSTEM.

W. M. Davis, of Chicago, Ill., patents (No. 763,374) and assigns to the Stromberg-Carlson Telephone Manufacturing Company an improved telephone system which is shown in the accompanying illustration. The object of this invention is to provide a telephone system in which there is an improved method of testing so that when the operator tests a line the subscribers will hear no click. The operation of this system will best describe it. The ordinary substations are shown at *A* and *B*. The removal of the receiver *A* completes a circuit through the line relay *18*, attracting its armature *20* and lighting the lamp *19*. The operator inserts an answering plug *25* in jack *17*, thereby breaking the contact between the spring jack *22* and extinguishing the line lamp *18*. The operator then connects her telephone with the circuit. The insertion of plug *25* closes circuit through



the supervisory relay *32* and energizes same and prevents the lamp *39* from lighting. Upon receiving the order the operator inserts the calling plug into jack *16*, and rings in the usual manner. When the subscriber *B* removes the receiver the supervisory relay *33* is excited, its armature attracted and the lamp *40* extinguished. The replacement of the receiver re-lights the supervisory lamps. Testing is performed as follows: The negative pole of the idle battery is permanently connected with the bus-bar *10* through the supervisory relays and impedance coil *36*. Thus the insertion of a plug raises the potential of the test-thimble to that of the negative pole of the idle battery. The manipulation of the listening key *29* connects the tip strands to the calling plug through the test relay *46*, the resistance *48*, the switch contact *15* and switch *12* to the positive pole of the idle battery. Then the application of the tip contact of the calling plug to a test thimble closes circuit through the idle battery *14*, and the operator is informed whether the line is or is not busy.

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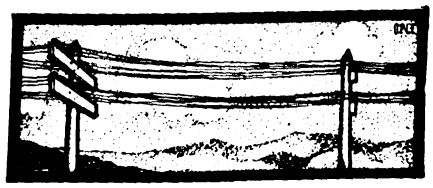
QUERIES

Questions on any subject relating to telephony will be answered on this page.



DUPLEX TALKING CIRCUIT.—(369.)

Has any arrangement of apparatus been devised which will allow two parties to use the same pair of wires at the same time? A. D.

As far as we are aware no system as you suggest has been devised. Numerous experiments have been conducted with this end in view, but without commercial success. The number of natural obstacles in the way, such as inductance capacity and the varying frequencies of the talking currents have so far proved insurmountable.

PLACING CROSS ARMS.—(370.)

As I am new at the business, will you please tell me how cross arms should be put on poles? P. M. B.

The method of placing cross arms is shown in Fig. 370. It will be noticed that every other cross arm is mounted on the opposite side of the pole. The reason for that is this: If for any reason one arm should be pulled off or one pole come down, if

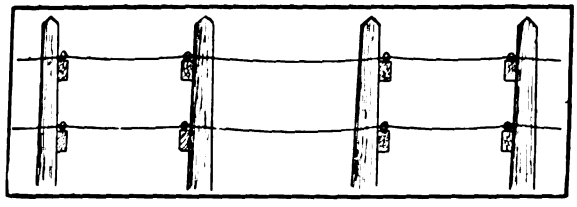


Fig. 370.

all the arms were on the same side as the falling cross arm or pole there would be a tendency to pull all the other arms off, whereas when they are placed as shown the poles act as a brace or stop and so prevent the line coming down unless the poles go with it.

STROMBERG-CARLSON CIRCUITS.—(371.)

Can you give diagrams of the Stromberg-Carlson central energy multiple board line circuit, also cord circuits of local to toll and toll to local? R. G.

The Stromberg-Carlson Telephone Company has issued a large number of various circuits. If you will specify which ones you desire we will endeavor to obtain the same for you.

CHANGE SERIES TO BRIDGING.—(372.)

We have a number of series telephones on our lines; we wish to change them to bridging. Can you give us any information as to how to go about making the change? N. T. C.

To change series to bridging instruments is in almost all cases impracticable if not impossible. Aside from the difference in circuit connections the generator and bells would have to be materially changed. Series ringers have a resistance of about 80 ohms, whilst bridging bells vary from 1,000 to 1,500 ohms. It is therefore doubtful if you could rewind the spools and get on enough wire. Series generators have a comparatively small current output, and on account of the weakness of the magnetic field it is doubtful even if the armatures were rewound whether it would be possible to ring any of the bells. Your best plan would be to see whether you could mount a bridging bell and the right size generator in the bell box; if not, to secure new magnetos which would be the most satisfactory change to make.

IRON OR COPPER CIRCUITS.—(373.)

We wish to build some new lines. Which would be better to use, iron wire and put fewer parties on a line, or to use copper and put on more? X. Y. Z.

With the information you have given us it will be practically impossible to answer your query except in a general way. From the point of transmission and length of life a copper circuit is far superior to iron. Again, if the lines are at all long, iron wire, on account of its resistance, is impractical. If your switchboard is of a central energy type then copper wire must be used on all but very short lines on account of the drop of potential and consequent decrease in amount of current available to successfully operate the transmitter. It is our opinion that under all circumstances copper is far superior to iron and even if the cost necessitates placing more parties on a line it is better policy to do so.

TRANSPOSING.—(374.)

We have quite a dispute over transposing lines and want you to help us out of the difficulty. Does it make any difference whether or not left is carried over right or right over left one time and then the next reverse? When you start with left over right, don't you have to keep left over right for each and every transposition? In other words, don't you have to keep the same side over and the same side under all the way like you start, and not have one over and the next time have the same side under? P. W. S.

In a telephone cable each pair of wires is twisted in such a manner that both revolve about an axis which passes through the center of the twist. The theory of making telephone transpositions is exactly the same as that of making twisted pairs; that is to say, the two sides of the line should revolve about each other and there should be, theoretically, no difference between the twisted pair of a cable and the twisted pair of aerial lines, excepting that the twists in the aerial line are usually 1,000 or 1,500 feet in length, while those of the cable are only 4 or 5 inches in length.

Any practical method which accomplishes this twisting of the circuit is sufficient for transposition, as the wires of an aerial line must be supported upon insulators. Practical considerations require the passing of one wire first above and then below another, but all that it is necessary to keep in view is that the twisting should be carefully and thoroughly carried out.

FALSE BUSY TEST.—(375.)

Could you please explain what is meant by a "false busy test?" J. C.

A false busy test upon a common battery system is one in which the sleeve or thimble of the jack has battery crossed with it, so that when the operator touches the sleeve with the tip of the cord, which is grounded, a circuit is closed through the test circuit of the listening set and indicates that the line is busy. The normal condition of the sleeve of the jack being grounded when a test for busy would give no results. Should the line be in use, the sleeve of the plug in another position or in the answering jack would supply battery to the sleeve of the line that might be tested, and so indicate that it was in use.

POSITION OF GUY WIRE.—(376.)

Where should a guy wire be placed so as to strengthen a pole? J. D.

The correct point to fasten a guy wire is between the cross arms, where the resultants of the forces are equal. Many specifications, however, state that the guy wires shall be placed as near to the lowest cross arm as possible, so as to prevent the guy wire interfering with the lines. This point is shown at *a* in Fig. 376.

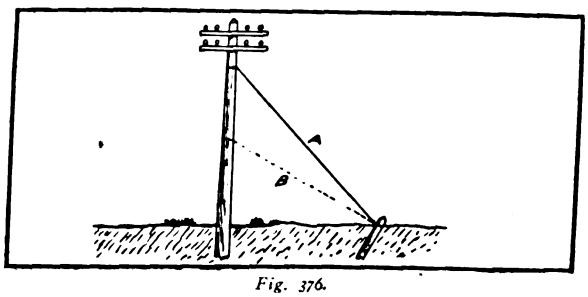


Fig. 376.

The greatest strain upon a pole is at the point of support, consequently if the guy wire is placed as at *B* the leverage strain will be greatest at this point and the protection desired by means of the guy wire is lost, whereas if the guard is fastened as at *A* the liability of the pole breaking is much reduced.

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THE WEEK'S MESSAGES

FINANCIAL.

MINNEAPOLIS, MINN.—The board of directors of the Tri-State Telephone & Telegraph Company has declared a semi-annual dividend at the rate of 5 per cent. on the common stock of the company.

SOUTH DOVER, MICH.—The South Dover Telephone Company has increased its capital stock from $1,000 to $2,000.

MINNEAPOLIS, MINN.—The board of directors of the Twin City Telephone Company has declared a semi-annual dividend at the rate of 5 per cent. on the common stock.

MANSFIELD, TEX.—The Mansfield Telephone Company has increased its capital stock from $4,000 to $5,000.

FRANCHISES.

EUSTIS, FLA.—H. W. BISHOP has secured a franchise for constructing a telephone system here.

BLAKELEY, GA.—The Blakeley Telephone Company has been granted a franchise by the city council of Albany to construct and operate its system in that town.

MINNEAPOLIS, MINN.—The Tri-State Telephone Company, the long distance branch of the Twin City Telephone Company, has been granted a franchise by the city council of Willmar.

PERTH AMBOY, N. J.—The Hudson & Middlesex Telephone Company has applied for a franchise in this city.

RED CREEK, N. Y.—John A. Driscoll, of Rochester, chief manager of the Wayne-Monroe Telephone Company, has been granted a franchise by the city council. The company is now building west of Wolcott.

CINCINNATI, O.—The Queen City Telephone Company has applied for a franchise in St. Bernard.

CINCINNATI, O.—It is understood that the Queen City Telephone Company will ask the city council of Covington, Ky., for a franchise.

MT. PLEASANT, O.—The county commissioners have granted the Mt. Pleasant Telephone Company, on request, the right to construct lines along the highways of the county.

CORVALLIS, ORE.—The city trustees have granted a franchise for an Independent telephone company.

BROWNWOOD, TEX.—The Central Texas Telephone Company has applied to the city council of Brownwood for a franchise for the establishment of a telephone system here.

DALLAS, TEX.—F. B. McElroy, of Chicago, who represents the proposed Dallas Independent Telephone Company, has telegraphed his intention of making a deposit of $5,000 as an earnest of good faith in his application of a franchise.

DALLAS, TEX.—A. L. Waterbury and Charles Webster, Minnesota capitalists, have deposited with the city treasurer $5,000 as an earnest of good faith in their application for an Independent telephone franchise.

COMBINATIONS.

BROWNSTOWN, IND.—The Brownstown Telephone Company has purchased the property of the Jackson Telephone Company with a small exchange at Tampico.

MONMOUTH, N. J.—The Monmouth Toll Line Company has purchased the Red Bank Independent Telephone Company's property.

CARTHAGE, N. Y.—The stock of the Northwestern Telephone and Telegraph Company, of Carthage, has been purchased by J. K. Whittaker, treasurer of the Citizens' Telephone Company of New York. The Carthage exchange will be under the management of C. D. Warner, manager of the Citizens' Telephone Company, of Watertown. Many improvements are contemplated.

BELLAIRE, O.—It is rumored that the Ohio Valley Telephone Company of Bellaire, has been sold to J. B. Driggs.

PARKERSBURG, W. VA.—At a meeting of the stockholders of the West Virginia Western Telephone Company, it was decided to merge the interests of that company with the Marietta Independent Telephone system. This was done to retain the services of J. H. Linginger, president, and A. C. Davis, general manager, who were large holders of stock in the Marietta company, and who had intended to resign in order to give all their time to that company's interests.

MISCELLANEOUS.

DOUGLAS, ARIZ.—The Douglas Improvement Company is distributing a new directory, which shows a marked increase of subscribers over the previous issue.

PINE BLUFF, ARK.—The Pine Bluff Telephone Company's system here was seriously damaged by lightning recently.

OTTAWA, ILL.—The Ottawa Home Telephone Company has let the contract for the remodeling of the new building it will occupy.

CHIHUAHUA, MEXICO.—A long distance telephone system will be established here to connect all towns and mining camps throughout the State. L. J. Arellano, of Chihuahua, is the prime mover of the organization.

CULIACAN, MEXICO.—The State government of Sinaloa has prepared plans for the construction of an extensive system of telephone lines in this State. It is proposed to connect every town of importance in Sinaloa with Culiacan, the State capital. The line which was recently completed from Culiacan to Mazatlan is to be extended in various directions. The plans of the State government contemplate giving the State of Sinaloa more miles of telephone than any other State in Mexico.

PERSONAL.

W. R. BLODGETT, of Battle Creek, Mich., has been appointed manager of the Eaton County Telephone Company, with headquarters at Charlotte.

A. H. FOSTER has resigned as superintendent of the Rochester, Minn., Telephone Company.

A. A. GARRIS has resigned as manager of the Iron Range Telephone Company's exchange at Bemidji, Minn.

J. J. LANE has been appointed manager of the telephone exchange at Colfax, Wash., to succeed E. C. Drews, who has resigned.

GEORGE N. PIERCE, formerly representative of the Vought-Berger Company, of La Crosse, Wis., has been compelled through ill health to resign his position.

G. F. STEARNS has been appointed manager of the Enterprise Telephone Company of New Hardwick, Minn.

UNDERGROUND.

WILMINGTON, DEL.—The Delaware & Atlantic Telephone Company is arranging to put all its wires in Wilmington underground.

KNOXVILLE, TENN.—The People's Telephone Company is extending its underground system throughout the city.

NEW COMPANY NOTES

TUCSON, ARIZ.—The Independent Telephone Company has been incorporated with a capital stock of $100,000, by H. M. Joy, A. J. Edwards and Judge J. H. Kibbey.

MARK WEST, CAL.—The Mark West Creek and Santa Rosa Creek Telephone Company has been incorporated with a capital stock of $15,000. The directors are: R. W. Paterson, H. L. Hall, J. M. M. Laughlin, C. V. Talmadge and S. W. Purrington.

WILMOT, IND.—The Wilmot Telephone Company has been incorporated with a capital stock of $10,000, by L. R. Gerrard, J. W. C. Scott, H. T. Kline, George S. Bouse, G. F. Brenninger, M. L. Hussy, and R. R. Scott.

URBANA, IND.—The Urbana Independent Telephone Company has been incorporated with a capital stock of $10,000, by Emanuel Staver, Adam Cook, George Pretarious, E. F. Baker and J. C. Schmalzreid.

TEMPLE HILL, ILL.—The Egyptian Mutual Telephone Company has been incorporated with a capital stock of $2,500, by William C. Holmes, H. M. Stockes and John Mann.

WILLIAMSVILLE, ILL.—The Williamsville and Sherman Telephone Company has been incorporated with a capital stock of $25,000. The directors are S. T. Jones, C. M. Woods and others.

OGDEN, IA.—The Mercey Mutual Telephone Company, of Ogden, has been incorporated with a capital stock of $20,000. The incorporators are: John Olson, C. H. Williams, Simon Peterson, J. S. Miller, Chas. Houstrom, A. B. Morgan, William Hiland, John S. Dickson and John Sparks.

WELDON, IA.—The Smyrna & Weldon Telephone Company has been incorporated with a capital stock of $250, by W. N. Hall, T. B. Jamison, George A. Beatti, Arthur Hoover and John Cannon.

SAVONBURG, KANS.—The Savonburg-Teanna Mutual Telephone Company has been organized with the following officers: W. G. Taylor, president; V. B. Richardson, vice-president; Richard Blair, secretary; O. D. Courtney, treasurer; Alfred Barnett, superintendent; Charles Nelson, A. P. Wisborg and C. A. Reynolds, trustees.

HAZARD, KY.—The Big Leather Telephone Company, of Hazard, has been organized to construct a line to Hazard, Viper, Jesse and Cornettsville. The incorporators are: Arch Cornell, Jesse Morgan and Bailey Wootten.

HYDEN, KY.—The Hyden Telephone Company has been organized to connect the towns of Hyden, London, Pineville, Manchester and Barbourville.

MOSCOW, KY.—The Home Telephone Company has been organized at Moscow. Dr. John Mahan is president, and A. B. Atherton, vice-president.

NORVELL, MICH.—The Norvell & Manchester Telephone Company has been incorporated with a capital stock of $375. The directors are: G. B. Holloday, D. E. Palmer, C. P. Bancroft, W. B. Lowery and William Hoag.

CLAYTON, MO.—The Suburban Telephone Company, with headquarters at Clayton, has been incorporated with a capital stock of $100,000. The stockholders are: J. Percival Phelan, C. R. Black, H. W. Karrenbrock, W. Lee Travers and James D. Housman.

SENATOBIA, MISS.—The Tate County Telephone Company, with headquarters at Senatobia, has been incorporated with a capital stock of $1,000.

MERTON, MINN.—The Merton Rural Telephone Company has been organized to construct a line from Owatonna to Merton. The officers are: L. D. Carleton, president; N. O. Partridge, secretary, and James Mooney, treasurer.

LEIGH, NEB.—The Leigh Telephone Company has been incorporated.

ARTESIA, N. M.—The Artesia Telephone Company has been incorporated with a capital stock of $25,000, by Harry W. Hamilton, Samuel P. Denning, James A. Cottingham, of Roswell, and John R. Hodges and Mark Smith, of Artesia.

AUBURN, N. Y.—The Cayuga & Seneca Telephone Company, of Auburn, has been incorporated with a capital stock of $20,000, by E. C. Aiken, F. A. Mohr and H. W. Fluhrer, of Auburn.

CHERRY CREEK, N. Y.—The Conewango Valley Home Telephone Company has been incorporated with a capital stock of $10,000, to operate in the towns of Cherry Creek, Charlotte, Villenova, Arkwright, and other towns in Chautauqua and Cattaraugus counties. The directors are: A. H. Libbey, of Forestville E. B. Crissey, of Jamestown; B. C. Wilson, South Dayton; E. J. Helmick, Cherry Creek; W. J. French, of Hamlet; C. H. Lake, of Jamestown; Ernest B. Dye, of Cherry Creek; C. G. Mead, South Dayton; G. W. Rood, E. W. Storms and S. H. Swetland, of South Dayton.

CHESTER, N. Y.—The Chester Telephone Company has been incorporated with a capital of $2,000. The directors are G. M. Roe, T. T. Lawrence, and others.

EAST RANDOLPH, N. Y.—The East Randolph Telephone Company has been incorporated with a capital stock of $10,000, by Roland Dow, Nellie Dow and Isidor Dow.

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MORGANVILLE, N. Y.—The Stafford Telephone Company, of Morganville has been incorporated with a capital stock of $3,000, by Jay Lathrope, James Wright and W. S. Daniels, all of Morganville.

PITTSTOWN, N. Y.—The Pittstown Telephone Company has been organized with the following officers: J. B. Cushman, president; Stewart Humphrey, vice-president; Ellery Norton, secretary; and H. T. Reed, treasurer. The directors are: Isaac Norton, H. T. Reed, J. B. Cushman, G. A. Rose, Stewart Humphrey, Merrett Hoag and Ellery Norton.

STAFFORD, N. Y.—The Stafford Telephone Company has been incorporated with a capital stock of $3,000, by J. Lathrope, J. A. North and H. E. Ganiard, of Stafford.

CHATHAM, O.—The Chatham Farmers' Mutual Telephone Company has been incorporated to give telephone service in Medina County. The incorporators are: A. B. Morst, J. Yoder, Jr., W. H. Ripley, D. A. Clapp and A. R. Clapp.

FOSTORIA, O.—The West Millgrove Telephone Company has been incorporated with a capital of $3,000. The incorporators are: W. W. Rosendale, J. P. DeWolfe, C. D. Stearns, J. C. Rhodes, and S. S. Ghaster.

INDEPENDENCE, OKLA.—The Deer Creek Mutual Telephone Company has been chartered with a capital stock of $50,000, to construct and operate a telephone system in Custer and Dewey Counties. The incorporators are: W. E. Cooper, J. W. Grigsby, Charles Patterson, J. M. Nelson and C. M. Collins, of Independence, and J. M. Nelson, of Seven Oaks.

DAYTON, ORE.—The Yamhill County Mutual Telephone Company, of Dayton has been incorporated with a capital stock of $3,000, by R. M. Snell, F. L. Post, John Versteeg, J. W. Martin and J. E. Mellinger.

ORANGEBURG, S. C.—The Star Telephone Company has been organized to do business here.

BROWNSVILLE, TEX.—The Brownsville Telephone Company has been incorporated with a capital stock of $10,000, to build and operate a system in Starr, Neuces, Hidalgo and Cameron Counties, Texas, and in the State of Tamulikas, Mexico. The incorporators are: James B. Wells, Baldwin G. Steyman and Frank W. Kibbee, all of Brownsville.

HILLSBORO, TEX.—The Union Bluff Telephone Company has been chartered. Purpose, construction and operation of a rural telephone line in Hill County. Incorporators: G. H. Garrett, J. T. Daniels, R. L. Bookout and J. D. Bookout, of Hillsboro.

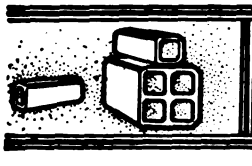
MECHANICSBURG, VA.—The Mechanicsburg Telephone Company has been incorporated with a capital stock of $5,000. J. Benton is president.

MONROE, WASH.—The Tualco Telephone Company has been incorporated by F. E. Ferguson, F. E. Phelps and T. W. Bennett, with a capital stock of $1,000.

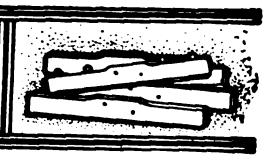
ROCKFORD, WASH.—The Rockford Telephone Company has been organized to build a line from Rockford to Mount Hope. The officers are: C. S. Shepard, president; G. Saunders, vice-president, and O. Sullivan, secretary.

HUNTINGTON, W. VA.—The Dry Fork Telephone Company has been chartered with a capitalization of $10,000, 10 per cent. of which has been paid in. The company has elected the following officers: J. R. Auville, president; Dr. Kardy, vice-president; B. F. Williams, secretary and treasurer; R. R. Smith, manager. The company was organized to build a telephone line from Iaeger, in McDowell County, to Tazwell, Va., a distance of thirty-five miles, work upon which will be begun at once and pushed to completion.

POINT PLEASANT, W. VA.—The Point Pleasant Telephone Company has been chartered to construct, maintain and operate telephone lines and central exchanges. Capital, $50,000. Incorporators: Wm. M. Haynes, C. C. Bowyer, Homer Smith, T. Stribling, J. S. Spencer, John McCullough, F. B. Tippett, E. B. Jones, Point Pleasant, W. Va.



New Construction in the Field



GREENVILLE, ALA.—It is stated that J. H. Riviere & Co. will put in a telephone system here, work to begin at an early date.

ELKHART, IND.—The Home Telephone Company, of Elkhart, is extending its lines with a view to connecting with the Granger exchange.

TERRE HAUTE, IND.—The Citizens' Telephone Company has extended its toll line to Lewis, and is contemplating other extensions and improvements.

WORTHINGTON, IND.—The Worthington Telephone Company is at work extending its lines. A new cable will be placed in position and the entire plant rearranged. It is also arranging for connecting with others in the new territory.

DES MOINES, IA.—The Hawkeye Telephone Company is arranging to install an exchange at Fort Des Moines with 100 subscribers, most of which will be on rural lines surrounding the post.

ELKADER, IA.—The Interstate Telephone Company is putting in a toll line from Mederville to Elkader.

SIOUX CITY, IA.—The Sioux City Telephone Company will build a new three-story stone and brick building, at a cost of $25,000.

CLEARWATER, KANS.—The Farmers' Mutual Telephone Company, of Clearwater, expects to build three new lines to connect fifty farmers in the future.

CONWAY SPRINGS, KAN.—The Home Telephone & Electric Company, of Conway Springs, has completed a toll line to Norwich, Kans. It will commence work on rural lines at once, as a number of orders for farmers' telephones are on file.

HARRIS, KANS.—The Harris Telephone Company is building several miles of new lines connecting Westphalia and Pottowatomie to Harris, and will build other lines as fast as possible.

LE ROY, KANS.—The Le Roy Telephone Company will build a toll line to Northcott and Aliceville.

LOUISVILLE, KY.—The Home Telephone Company has made arrangements to place an exchange in Shelbyville.

BLY, MO.—Frank Crowly is constructing an Independent telephone line from Bly to Bakerfield.

GREEN CITY, MO.—The Union Telephone Company is installing a new switchboard here and will construct several new lines. Charles Hill is superintending the work.

SPRINGFIELD, MO.—J. J. Speed, manager of the Home Telephone Company, has gone to Chicago to purchase the necessary equipment and material to increase the capacity of the local exchange from 1,800 to 2,500 lines. Mr. Speed will contract for 47,000 feet of cable, new switchboard sections and telephones.

WEST PLAINS, MO.—C. H. Gale, owner of the West Plains Telephone Company, and W. N. Hicks, owner of the Willow Springs Telephone Company, are constructing a line connecting West Plains with Willow Springs.

GREAT FALLS, MONT.—Duncan Cameron, of Black Butte, has arranged for the construction of a new telephone line from Great Falls to Eden, Meisenbach, Black Butte and Evans.

GRAND ISLAND, NEB.—The Grand Island Telephone Company has a large force of men at work constructing its new system.

ALAMOGORDO, N. M.—The Alamo Telephone Company will extend its lines to Weed.

HOOSICK FALLS, N. Y.—At a meeting of the directors of the Eastern New York Telephone and Telegraph Company, a semi-annual dividend of 3 per cent. was declared. C. B. Story was awarded the contract for the extension of the company's lines.

LE ROY, N. Y.—The Inter-Ocean Telephone Company is building new lines in this vicinity.

RANDLEMAN, N. C.—The Randleman Telephone Company will connect its exchange at High point with other systems in the neighborhood.

HIGH POINT, N. C.—The High Point Telephone Company and the Randleman Telephone Company are erecting a copper circuit from High Point to Randleman, a distance of about twenty miles. A copper circuit from High Point to Thomasville was completed several weeks ago.

CADIZ, O.—The United States Telephone Company has commenced the construction of lines between Cadiz and Uhrichsville.

LEETONIA, O.—Henry A. Halverstadt contemplates the formation of a telephone company in this vicinity to construct and operate an Independent telephone system.

GRANT'S PASS, ORE.—J. H. Cradelbaugh, of the Merlin Townsite Company, states that the company will build a telephone line from Merlin to Glace.

DOYLESTOWN, PA.—The Standard Telephone Company's lines were damaged to the extent of several thousand dollars by a storm.

READING, PA.—The Consolidated Telephone Company has decided to extend its lines to West Reading and Mount Penn Borough. The West Reading line will be extended to Wyomissing and the river will be crossed by means of a cable.

CLARKSVILLE, TENN.—About 100 subscribers have been secured to a petition asking the Home Telephone Company of this city to construct a line to Trenton and install an exchange there.

HONEY GROVE, TEX.—A. L. Hill, formerly manager of the telephone company at Smithville, Tex., will install a telephone system at Honey Grove.

BEYERSVILLE, TEX.—A telephone line is to be built between this place and Taylor, Tex., a distance of six miles. William Rummell and Robert Stummhofer, of Beyersville, are interested in the project.

LA CROSSE, WIS.—The Pine Creek Valley farmers have organized an Independent telephone company to connect with the La Cross Telephone Company's lines.

PORTAGE, WIS.—The Portage Telephone Company is completely rebuilding its plant, placing all of the wires in the business portion of the city underground. After the construction is completed and the changes made in apparatus, it will have one of the most thoroughly up-to-date telephone exchanges in the Middle West.

MONROE, WIS.—The Belleville Telephone Company has leased the line to Dayton and constructed a line to Basic, and also lines north and west from Paoli.

RACINE, WIS.—The Badger Telephone and Telegraph Company will extend its line from Eikhorn to Racine and toll lines will be built to St. Paul and Minneapolis.

WILTON, WIS.—The Ontario & Wilton Telephone Company will build an additional mile and a half of line to accommodate the large number of subscribers recently secured.

TRADE NOTES

THE MONARCH ELECTRIC & WIRE COMPANY, 125 S. Clinton street, Chicago, Ill., has recently shipped several carloads of telephone supplies out West. Its western business is very encouraging and business in general is good.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY, of Meriden, Conn., reports large sales of its weatherproof iron box telephone, which is especially designed for mine, street railway and police systems. The company will send its large and new catalogue, which is profusely illustrated with telephone material, on request.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, of Chicago, has completed delivery of the new exchange equipment for the Portage Telephone Company, Portage, Wis. It consists of its latest type of lamp line central energy apparatus arranged for an ultimate capacity of 1,200 lines, with 500 lines equipped. The International also furnished all of the

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auxiliary apparatus for the local exchange, consisting of storage batteries, power board, charging machines, battery cabinets, protective devices, etc., and will also furnish an initial order of 400 central energy telephones.

THE KESTER ELECTRIC MANUFACTURING COMPANY, of 44 to 56 N. Union street, Chicago, Ill., is loaded up with orders for its self fluxing solder. No new orders are being taken until after present ones are filled.

THE CRAWFORDSVILLE WIRE NAIL COMPANY, of 1501 Monadnock Block, Chicago, Ill., reports extraordinary sales of galvanized wire for telephone purposes. The factory is running overtime to keep up with orders on hand and coming in.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY, of 186 Fifth avenue, Chicago, Ill., has had to supply an increased demand for general construction material, and for the last few months has enjoyed a very heavy run on its "Mesco" dry batteries for telephone use.

THE OHIO VALLEY GLASS TELEPHONE COMPANY, of 1501 Monadnock Block, Chicago, Ill., has closed its factory until August 15th, and if hot weather continues will not open up full force until September 1st. At present the company is fifteen carloads behind on stock orders.

THE BAIRD MANUFACTURING COMPANY, of 35 Michigan street, Chicago, Ill., has recently gotten out a new 32-page catalogue on telephone, pay-station and measured service equipment. It fulfills its mission very well by being well written and excellently illustrated. The business of the company is in a very healthy state, in fact, so much new business has been coming in that the factory has not been able to keep up with it.

G. M. GEST, the expert subway contractor, of New York and Cincinnati, has just been awarded a large contract for the construction of a conduit system through the lower part of Brooklyn, leading from the new power house of the Brooklyn Heights R. R. Co. to their new substation. The same contractor was awarded a contract for the construction of an extension to the subway of the Brooklyn Edison Electric Illuminating Company.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, of Buffalo, N. Y., has recently issued Bulletin No. 11, describing its transfer type switchboards for common battery and magneto systems. Besides very thoroughly describing the boards, particular attention is given to the accessories, such as signal bells, plugs, ringing and listening keys, operators' transmitters and receivers. The company's make of substation instruments is also included in the descriptive matter. The bulletin is profusely illustrated with half tones of the apparatus, together with pictures illustrating recent switchboard installations. To all interested the company will mail this bulletin upon request.

FRANK B. COOK, of Chicago, Ill., has completed the shipment of a large distributing frame for the automatic exchange of the Home Telephone Company, of Los Angeles, Cal. This is what Mr. Cook styles his No. 444, with self-soldering heat-coils, and the frame is equipped for 4,875 pairs. He previously equipped the manual exchange of the Home Telephone Company with a frame having a capacity of over 10,000 pairs, and using Cook's well-known No. 4 protectors. Mr. Cook has also recently filled large orders for his protective devices from the Pittsburg & Allegheny Telephone Company, and from the Kellogg Switchboard & Supply Company, for their Louisiana Purchase Exposition exchange. A large order has also been received from Rome, Italy, showing that Cook's apparatus is well known in foreign countries as well as the United States.

THE STERLING ELECTRIC COMPANY is furnishing its different types of protective device to the following points: Newton, Ill.; Sparta, Wis.; Hoosick Falls, N. Y.; Chester, N. Y.; Columbia, Mo.; St. Louis, Mo.; Atlantic, Ia.; Kansas City, Mo.; Indianapolis, Ind.; Portland, Ind.; Deposit, N. Y.; Lyons, Ia.; Tiffin, O.; Columbus, O.; Crosswell, O.; Utica, N. Y.; Vassar, Mich.; Atlanta, Ga.; Lincoln, Ill.; Bay City, Mich.; Papillion, Neb.; Sheboygan, Wis.; Novinger, Mo.; Cairo, Ill.; Columbus, Ind.; Neosha, Mo.; Lincoln, Neb.; Birmingham, Ala. The Sterling Electric Company is also furnishing switchboard equipment of its well known single relay, common battery Bell type boards for Attica, Ind.; Deposit, N. Y.; Elkhart, Ind.; Tiffin, O.; Charleston, Ill.; Lyons, Ia.; Ottawa, Kan.; Crosswell, O.; Boswell, Ind.; Novinger, Mo.; Buck Creek, Ind.; Burr Oak, Mich.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Savings & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

FREE Sample to Agent. Practical ready call device for telephones. Saves brain work and hours of time. Sells itself. One sale sells dozens. Seeing is believing. Send stamp. The Telephone Appliance Co., One Madison Avenue, Dept. A. T. J., New York City. 193

FOR SALE—Switchboards and Telephones, all capacities and makes, Terminals, Cross-connecting Racks, Cable, &c., at less than half cost of new. Guaranteed reliable and efficient. Chicago Telephone Apparatus Exchange, 17 S. Elizabeth St., Chicago, Ill. 184

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

WANTED—By man and wife, exchange of 50 to 100 telephones. Have had about six years' experience. Wages right. References furnished. Address, Box 199, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 199

POSITIONS WANTED—Man and wife desire management telephone exchange. Wife, operator 4 years. Man, 7 years' experience in maintenance and traffic. Executive ability. Highest recommendations. Wages moderate. Address Box 203, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 203

POSITION WANTED—Telephone man, seven years' experience, Bell and Independent companies, first-class, desires position manager, superintendent or wire chief. Executive ability. Highest recommendations. Wages moderate. Address Box 204, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 204

POSITION WANTED—With a company that is building or reconstructing its plant. Thorough, practical and theoretical knowledge of the construction of aerial lines in the most economical manner. Up-to-date knowledge of the telephone business. The applicant is a young man, energetic, and enthusiastic. Address, Box 198, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 198

WANTED—Telephone engineer that is an A1 draughtsman, with ability to handle men, and is familiar with cable work and outside construction. Address, Box 202, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 202

WANTED—Second-hand Telephone Apparatus, Central Energy and Magneto Switchboards, Telephones, Bridging Bells, Transmitters, Terminals, Cross-connecting and Distributing Racks, Ringing Generators. State details, price, condition and make. C. E. W., 17 S. Elizabeth St., Chicago, Ill. 188

WANTED—Manager for a telephone plant of 1,500 subscribers. Must have a knowledge of the telephone business, not afraid of work, and have an affable manner in dealing with subscribers and meeting the public. Address, Box 201, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 201

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from 4-inch twenties up, for immediate shipment (we find the railroads have no difficulty in getting us cars promptly now-a-days).

What Size shall we quote you on?

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WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

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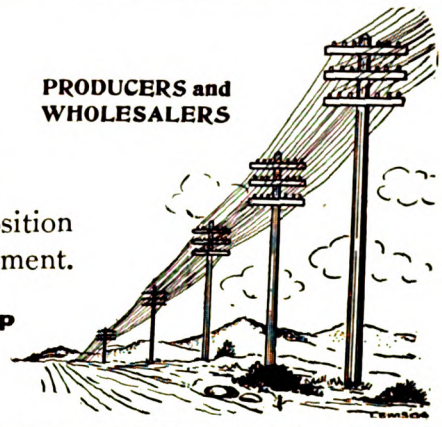

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"We have found our business with you very satisfactory, and hope we can do more business in the future."

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Large Stock Prompt Shipment.

LONG POLES A SPECIALTY

JOHN H. FOWLER, General Office, 1705 Fisher Bldg., Chicago. Branch Offices: {Washburn, Wisconsin and Milwaukee, Wisconsin.} **FOWLER-JACOBS CO.**

ELMORE-FOWLER-JACOBS CO.

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PLAIN AND GALVANIZED

9-16 X 9, 5-8 X 9, 5-8 X 10 INCH
Other Sizes Made to Order

We make our own steel and do our own galvanizing, therefore lowest possible prices and quick shipment.

INLAND STEEL COMPANY, First National Bank Building CHICAGO

RIGHT IS MIGHT!

OUR POLES ARE RIGHT

We know as much about Telephone Poles as anyone can. We know how to give prompt attention to your business and to secure prompt deliveries by railroad.

A letter from you asking prices or other information will have the same prompt and courteous consideration that we would give an order for 100 carloads of poles.

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CEDAR POLES

that they are now better equipped than ever before for maintaining their prominent position among the leaders in the cedar industry. Making a specialty of Poles, they are identified with the leading producing sections, concentrate their material at advantageous shipping points and are in position for giving their customers the best of service.

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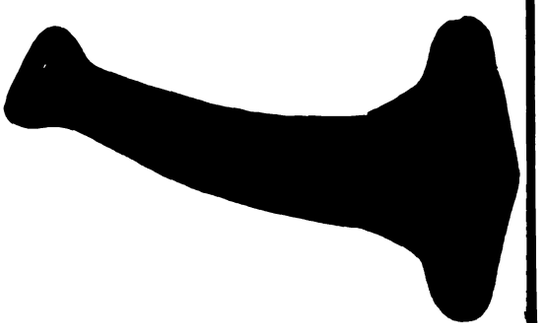

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If you want a telegraph pole ***that will outlast any two cedar poles,*** get the above. No decay. No dry rot. Nothing to give way. Test poles ***sound after thirty years.*** Price on long lengths same as cedar. Short lengths about one third higher. Address,

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Cost of Construction Reduced
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POLES and POSTS
From FRANK MULLEN, Ewing, IND.
Reasons Why for the Asking

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POLE PRODUCERS.
We are producers and save you the jobbers' profit. That's why our prices are lowest. A trial order will convince you. Also that our ***White Cedar Poles*** are the finest in the land. Write for prices F. O. B. your town.

LARGE SIZES OF
CHESTNUT POLES, GUY STUBS, CORNER POSTS and POLES
For Special Use Carried in Full Stocks and Sold at Reasonable Prices
THE MEDORA MILLING CO.,
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Attractive Prices
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Good Quality . . .

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Manufacturers of GALVANIZED and PLAIN POLE STEPS, BRACES, BOLTS, WASHERS, PETTER DRIVE LAG SCREWS, GUY RODS, GUY CLAMPS, THIMBLES, ETC.
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Little things it is true, but they cut a big figure in line construction.
OUR MOTTO IS:
Prompt Shipment—Quality Satisfaction—Right Price
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YELLOW PINE CROSS ARMS
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A cussless, waitless, out-of-order-less
Girlless telephone?

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WRITE US FOR PRICES. WE CAN SAVE YOU MONEY.
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Complete Telephone Exchanges Built and Material Furnished.
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WESTON STANDARD PORTABLE
DIRECT READING
Voltmeters, Ammeters, Millivoltmeters, Voltammeters Milammeters, Ohmmeters, Portable Galvanometers, Ground Detectors and Circuit Testers.
Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS AND AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.
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Chicago Insulated Wire Co
Bare and Insulated ELECTRIC WIRES AND CABLES
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Write for our Catalogue and Net Price.
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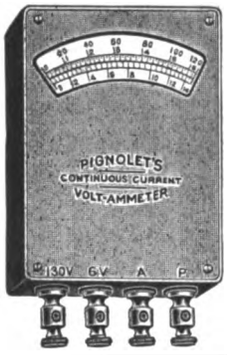

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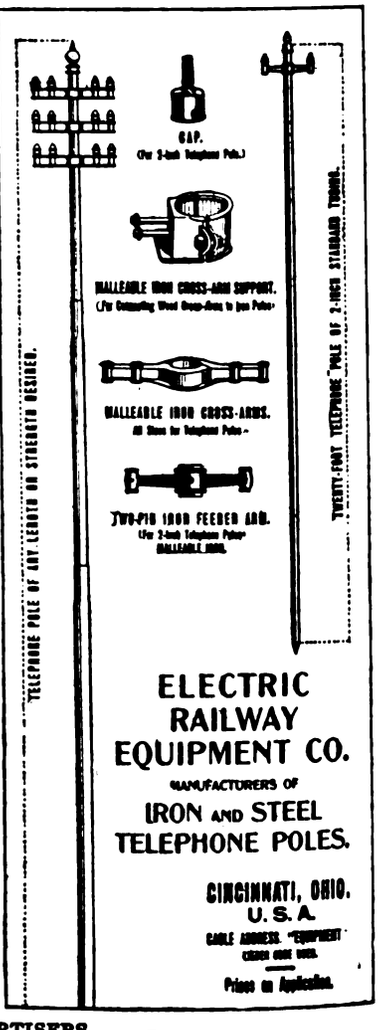

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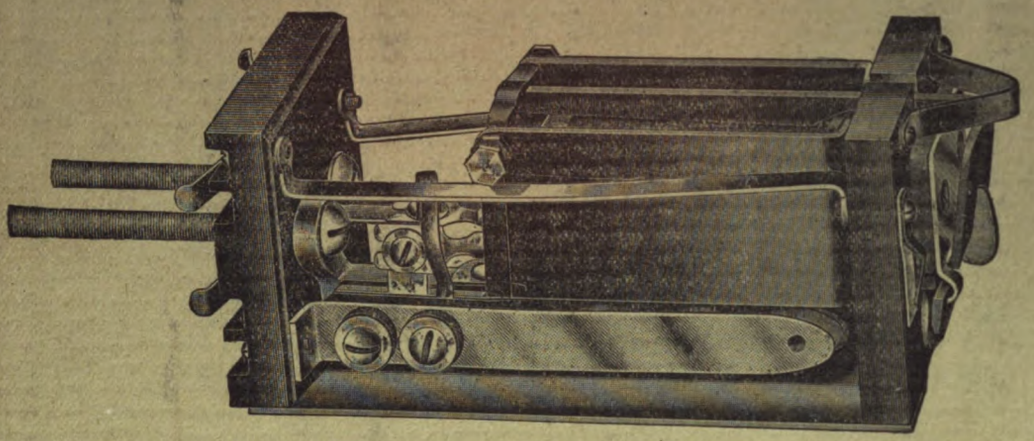

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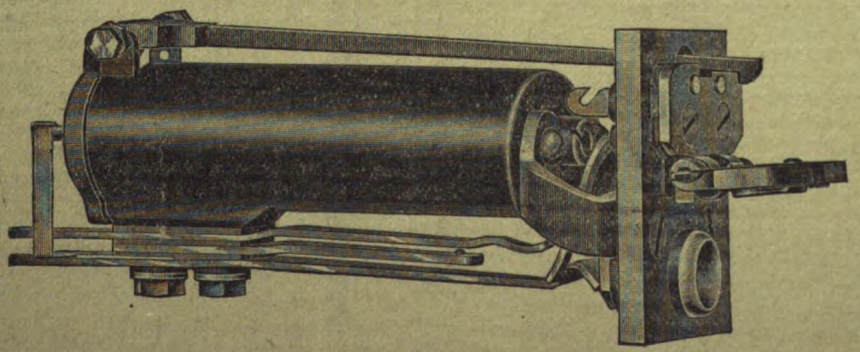

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Edited by WILLIAM HENRY McDONOUGH

Volume 10 NEW YORK—JULY 16, 1904—CHICAGO Number 3

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Advertisers' Directory, Page 9

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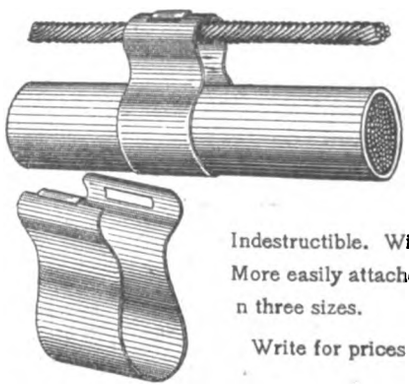

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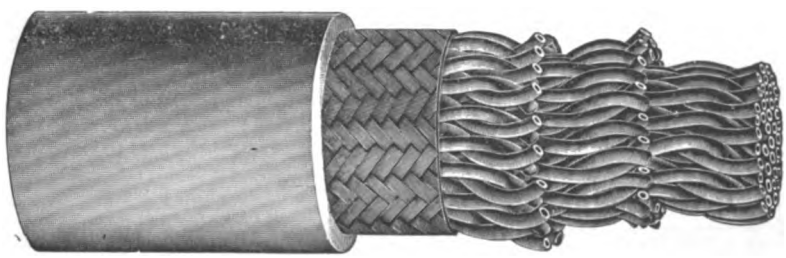

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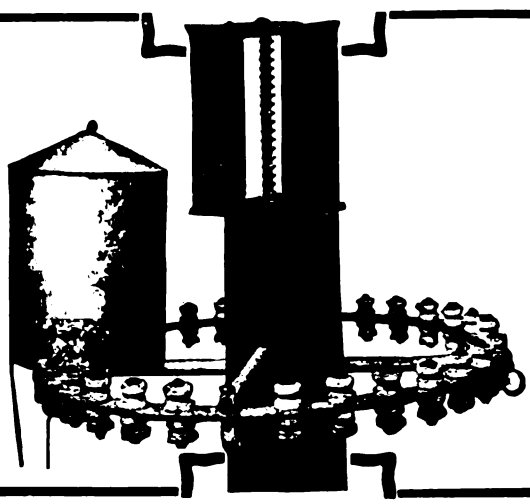

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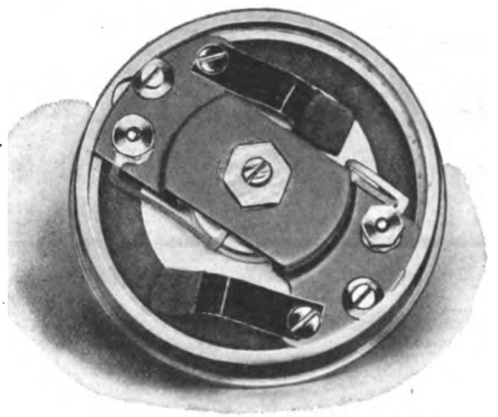
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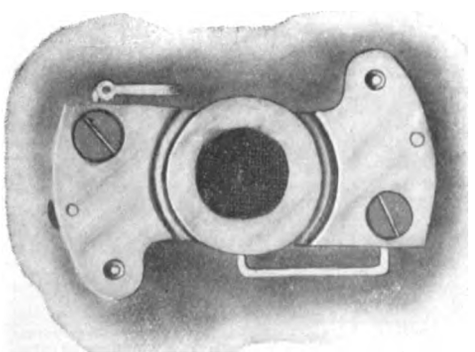

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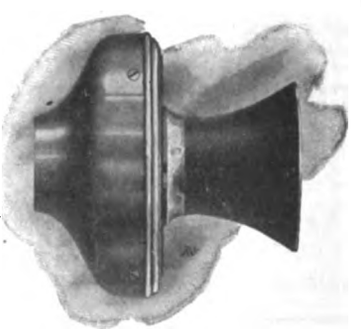

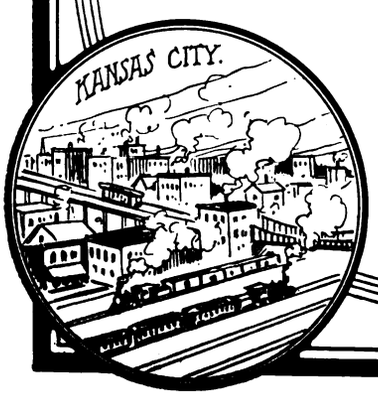
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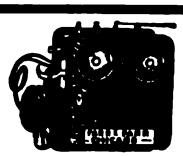

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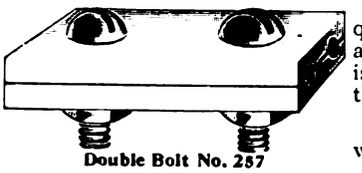

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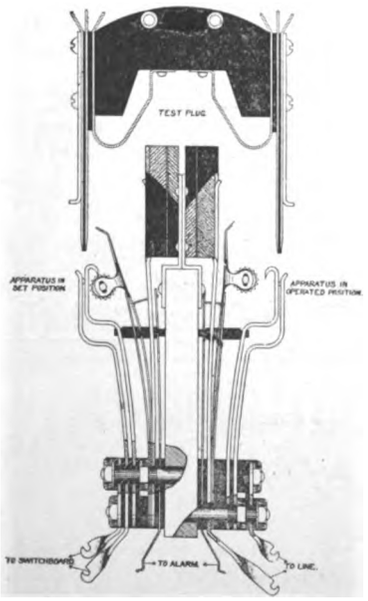

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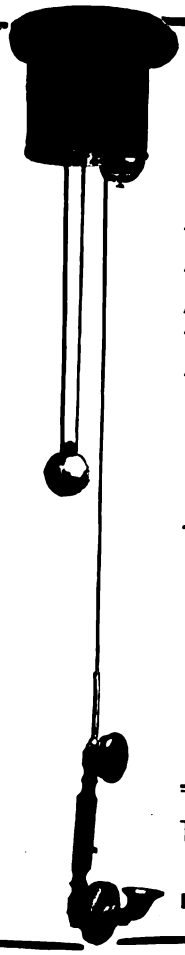

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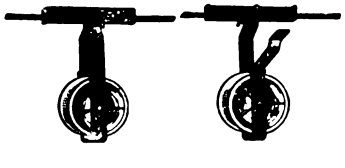

A thousand feet of cable is easily pulled **in ten minutes** by only two men after trolleys are in position.

The old way cost too much, and of the various new schemes for stringing cables all have been pronounced complicated and defective, except this very natural and sensible way of using trolleys.

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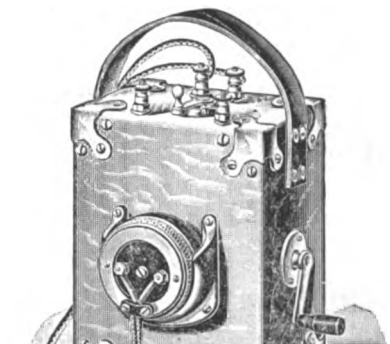

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This instrument is made upon the same lines as the Bell test sets, and is the only 'Phone of its kind made by any independent telephone manufacturing concern.

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Bulletin with full description on request

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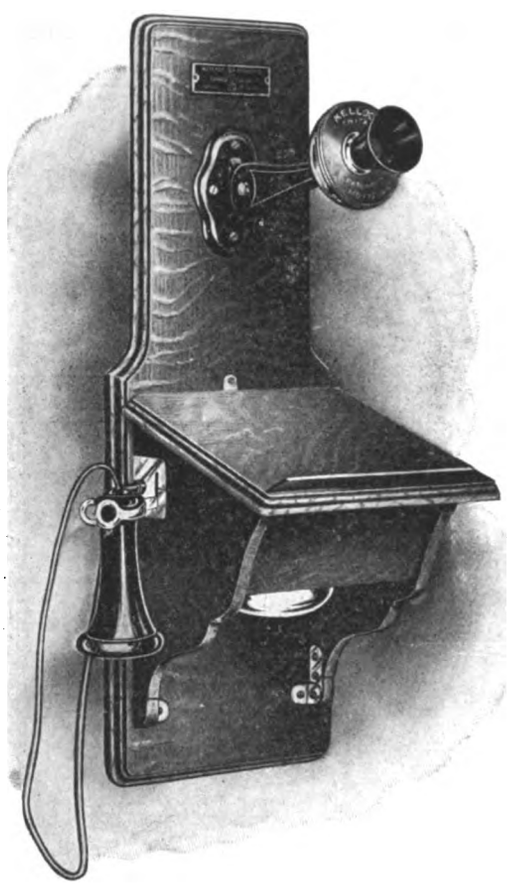

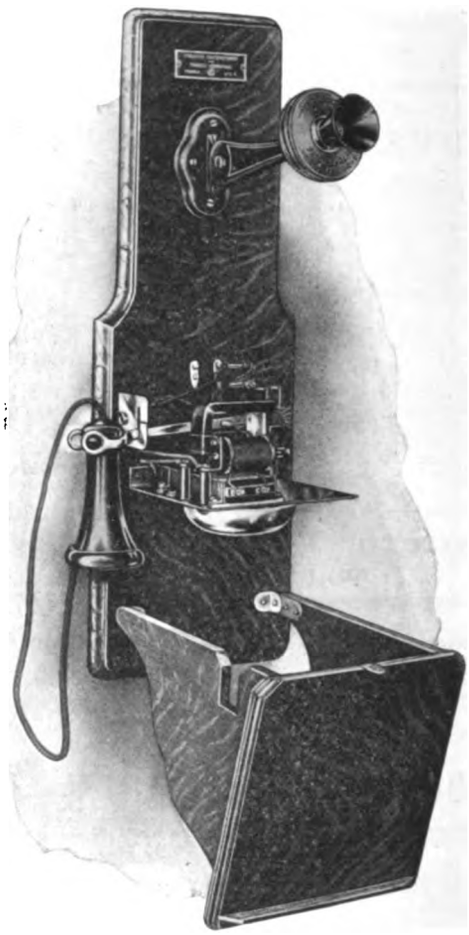

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This Telephone rings for the desired party alone, and does not ring in any way for any other party on the line.

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It Rings Loud.

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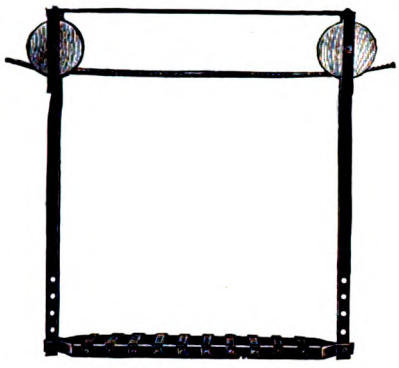

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decreases your cost of stringing cable by one-half.

Our "Ready" Cable Car

has adjustable seat, is strong and light in weight.

Secure our Prices on Cable and Telephone Supplies.

The W. G. Nagel Electric Co.

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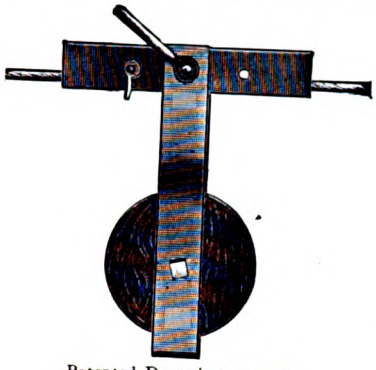

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"Ready" Cable Trolley

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FOR single and metallic circuit. That will outlast three of other makes.

The steel spiral is tough and flexible, and it's impossible to break it.

It's covered with the best linen thread, woven by our special process and made in six colors: red, blue, green, yellow, brown and drab.

Write today for sample and price.

ERICSSON TELEPHONE CO.
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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW
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Add to your income by installing intercommunicating telephones in the many places in your town where they can be used to advantage. Bulletins Nos 148 and 149 show the proper apparatus to use and include twenty diagrams of circuits.

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DESK TELEPHONE

Modern in Every Respect

Series Bridging or Central Battery Systems

Bulletin 8 Tells the Story; Send for It.

S. H. Couch Co.,
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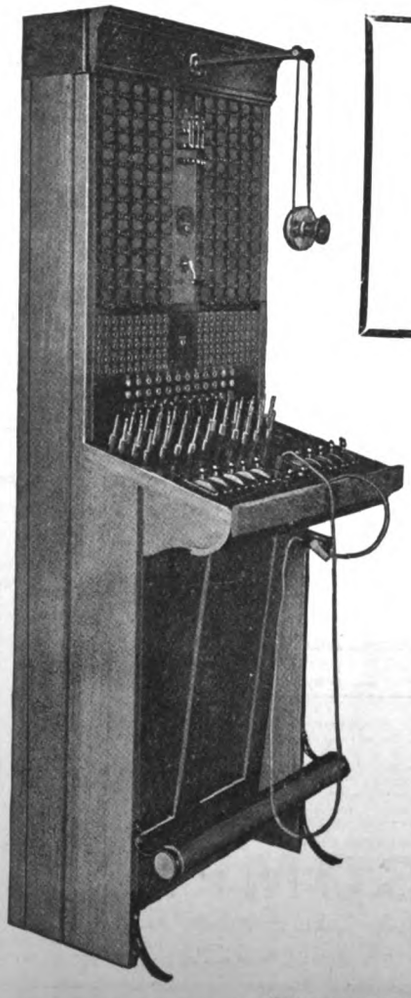
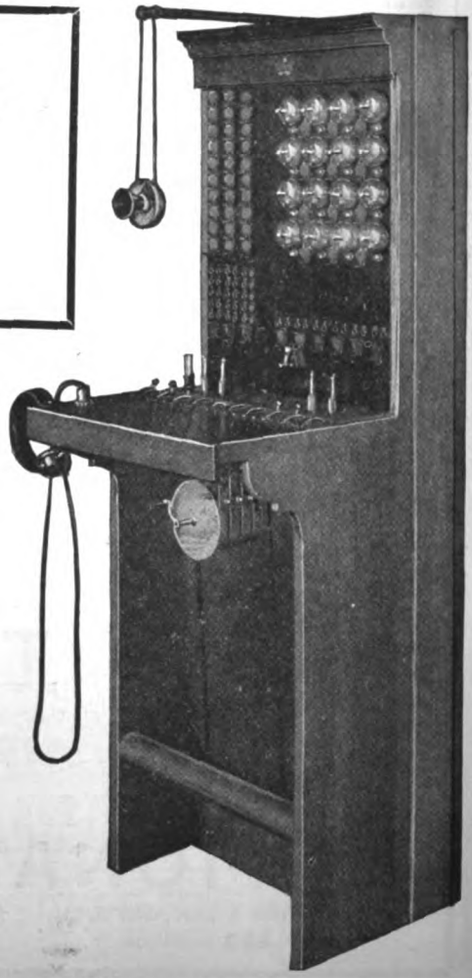


SWITCHBOARDS
TELEPHONES
PROTECTORS

If You Don't See What You Want, Ask For It

WE MAKE IT

Sterling Electric Co.
LAFAYETTE, IND.



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CENTURY No. 85 DESK SET
"TRIED AND TRUE"

Switch can be inspected in less than one minute without removing the receiver from the hook.

The Heavy Pressed Hook mounted on solid stem supporting the switch reduces the chances of injury by accident to a minimum.

TRY ONE

Switchboards Any System Any Size

No. 85 Desk Set Common Battery or Magneto

Showing Manner of Inspecting Hook

CENTURY No. 5
"Platinum Electrode" Transmitter?

Best on Earth

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OWNER AND OPERATOR OF
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WEBB CITY,
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CARTHAGE EXCHANGES.

HOME TELEPHONE COMPANY.

JOPLIN, MISSOURI.

June 6 , 1904.

Swedish-American Telephone Co.,
Chicago , Ills.

Gentlemen:-

In referring to your favor of the 1st., will say that it gives me much pleasure to state that the companies I represent have in the neighborhood of fifteen hundred Swedish-American telephones working , both central energy and magneto , bridging and series , desk sets of both systems . They are giving entire sarisfaction .

In addition to the satisfaction derived from the use of your equipment , our companies have always found your house willing and ready to promptly rectify any defects that have shown up in the use of so many instruments , in addition , according to us all the courtesies that any one could reasonably ask .

The telephones and treatment have been entirely satisfactory.

Yours truly
Theodore Gary
Pres & Mgr

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For they pay Benefits at once, while you have to die young or live to old age to win at insurance.

Better take out a few of our non-assessable, paid up, Booth Policies. Each one will yield a permanent income. Our illustrated booklet tells you all about it.

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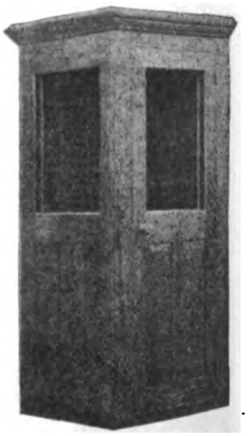

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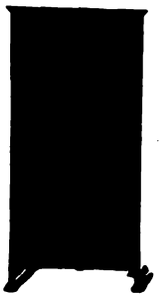
ARE NOT AS GOOD AS
EXPANDED
Metal Lockers
FOR YOUR OPERATORS.



A Safe and Sanitary place to leave wraps. Increases the efficiency of your Exchange. In use in hundreds of offices. Also

SHEET STEEL AND OPEN MESH MATERIAL CLOSETS

MERRITT & CO.,
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Telephone Wire

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BARE COPPER LINE WIRE
Weatherproof and Rubber Insulated Wire and Cables
Aerial—Underground—Submarine Lead Covered Cables
TERMINALS—STEEL STRAND—HANGERS

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The American Telephone Journal

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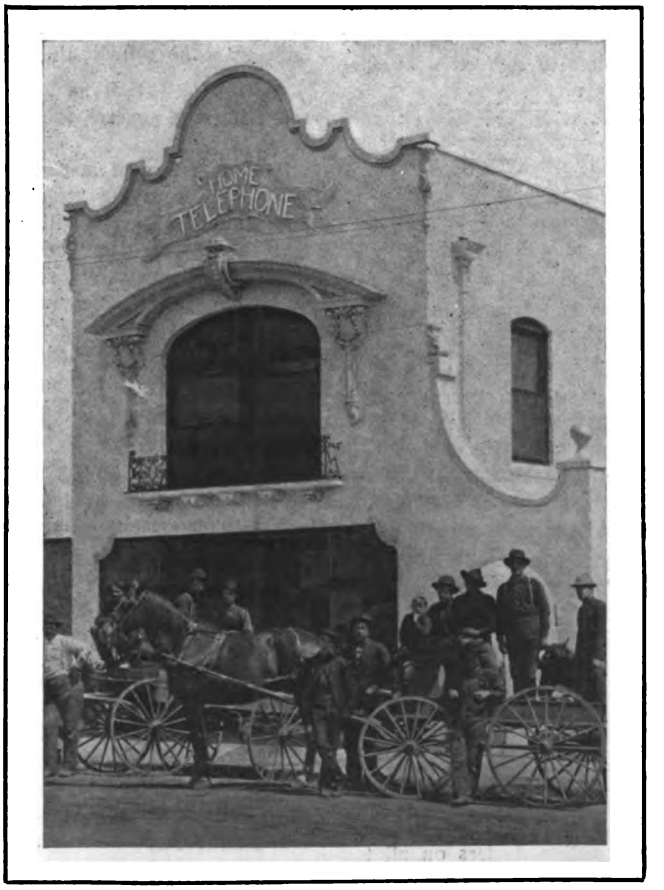
VOLUME 10 SATURDAY, JULY 16, 1904 NUMBER 3

THE SANTA BARBARA (CAL.) EXCHANGE

SANTA BARBARA is situated on the shore of Santa Barbara Channel, in Southern California, and is the county seat of Santa Barbara County. For a long while the need of an Independent exchange had been felt, but for some reason not altogether clear it was some time before a franchise was obtained, and only then after a hard struggle. Independent systems had grown up in every direction and it was necessary to obtain connection with Santa Barbara to establish a connecting link between the north and south. After the franchise had been secured, the company, known as the Santa Barbara Home Telephone Company, immediately commenced work. This was less than a year ago, and by April 1st, when the system was placed in operation, over 500 subscribers had been secured.

It was not expected that with so small a population (3,000) and such an aggressive opponent as the Pacific States Telephone Company, that the number of subscribers would exceed 600, but the report for July 1st shows a total in service of 752, and, what is more important, each and every one has a direct wire. This direct wire service is a feature of the company. The construction work was carried to completion by the Empire Construction Company, of Toledo, Ohio, under the effective direction of Mr. F. F. Graves, Mr. F. W. Wachter, the general superintendent, and Mr. Chas. Zahn, the engineer. A splendid building, built and owned by the Home Company, was erected on West Carrillo street, near State street, and is shown in the illustration.



The Santa Barbara (Cal.) Exchange.

The Santa Barbara Home Telephone Company is a strictly local organization, its stock being held exclusively by citizens of Santa Barbara and vicinity. Among subscribers to the stock are bankers, merchants, doctors, lawyers, school teachers, mail carriers, in fact, every industry or business is represented upon the stock records of the company. The officers of the company are: President, F. R. Vail; vice-president, Edward A. Gilbert; secretary, James R. H. Wagner; treasurer, Alfred Edwards. The directors are: D. S. Cook, John F. Diehl, and Charles F. Carrier. The position of general manager was given to Mr. Arthur E. Madison, a young man of exceptional commercial ability who made his debut with the Empire Construction Company.

The exchange equipment is of the highest order throughout, being central energy, with an ultimate capacity of 1500 lines. The switchboard is standard in design, mahogany finish. The combination night toll position forms part of the main board, but it is the intention at an early date to have a special toll desk for day use.

The lines connecting with Los Angeles, a distance of 125 miles, are now in operation and doing good work. Every detail of the switchboard has been watched carefully with a view to accuracy combined with speed. The battery room, relay rack, main and intermediate frames are in rooms separate from the main switchroom. The battery plant is the standard Chloride type, and consists of two sets of batteries of 11 cells each. These are charged by a Holtzer-Cabot motor-dynamo. The power board is of marble, with all the necessary switches, fuses, rheostats, etc., for properly operating the various circuits. These circuits are protected by standard Maxstadt fuses of suitable capacity. The volt and ammeters are also mounted on this power board, and close to it, and connected by switches, are two ringing generators, one operated by the power circuit and one by the batteries, the latter to be used only in case of break down. All the machines are mounted on solid foundations to reduce the vibration.

A chief operator's and wire chief's desk of the standard type form part of the equipment. The latter being supplied with suitable testing apparatus, so as to enable him to make the necessary tests to locate trouble, etc.

Santa Barbara is in direct telephonic communication with over 60 towns and cities in Southern California, among which may be mentioned Los Angeles, which has 15,360 subscribers, San Bernardino, Pasadena, Ventura, Arcadia, Hollywood, San Fernando, Redlands, Whittier, and Glendale. A branch exchange has been established at Montecito, which has so far 100 subscribers.

Southern California has been very friendly to the Independent movement, and the people as a whole have appreciated the great benefits it has brought them. That this is true is apparent by the thoroughness with which the whole of the country is being exploited for independent systems. The future of this section is unlimited, and the development which we might say has only just begun, is bound to continue and increase in proportion with the many other interests which are making Southern California to-day one of the best business fields in the country.

That this situation is appreciated by many, is evidenced in the steady stream of emigration which is gradually populating the whole of Southern California.

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TOLL AND TRAFFIC RULES ADOPTED BY N. Y. STATE INDEPENDENT TELEPHONE ASSOCIATION

OWING to the great increase of toll business of the various Independent companies forming the New York State Independent Telephone Association, a special traffic committee was appointed to investigate ways and means of handling the business in the most equitable manner, with reference to the compensation due the various companies over whose systems a message might pass; and also to consider the time and rate schedules. The recommendations of this committee submitted to the Executive Committee at the convention of the Association held at Buffalo and adopted are as follows:

MILEAGE.—We recommend that the air line mileage between any two given stations be used as a basis for determining tariff between the said stations, and that the United States Post Route map be adopted as a standard for determining air line distance; that for the purpose of facilitating the computing of mileage tables the so-called Ohio block system be adopted, and mileage tables be made up of distances between centers of block, the air line distances adopted between any two stations being the distance between the centers of the respective blocks in which said stations are located.

RATES.—We recommend the adoption of tariff rates based on a minimum charge of six-tenths cent per air line mileage for each conversation not exceeding three minutes' duration, but recommend the adoption of special rates necessary to meet competition.

We also recommend that the minimum rate between any two stations be fixed at ten cents, and submit the following scale of rates, based on air line distances, subject to correction by special rates necessary to meet competition:

Stations in same block	$0.10
10 to 19½ miles	.15
20 to 24½ "	.20
25 to 29½ "	.25
30 to 34½ "	.30
35 to 39½ "	.35
40 to 44½ "	.40
45 to 49½ "	.45
50 to 59½ "	.50
60 to 69½ "	.55
70 to 79½ "	.60
80 to 89½ "	.65
90 to 99½ "	.70
100 to 119½ "	.75
120 to 139½ "	.85
140 to 159½ "	1.00
160 ta 179½ "	1.10
180 to 200 "	1.20

The above rates subject to special rate charge to meet competition.

TIME LIMIT.—We recommend the adoption of a three-minute time limit for all toll messages, wth the following charges for each additional minute in excess of the three-minute limit:

First 3 min.	Each add. min.	First 3 min.	Each add. min.
$0.10	$0.03	$0.95	$0.30
.15	.05	1.00	.35
.20	.05	1.05	.35
.25	.05	1.10	.35
.30	.10	1.15	.40
.35	.10	1.20	.40
.40	.15	1.25	.40
.45	.15	1.30	.45
.50	.15	1.40	.45
.55	.20	1.50	.50
.60	.20	1.60	.55
.65	.20	1.70	.55
.70	.25	1.80	.60
.75	.25	1.90	.65
.80	.25	2.00	.65
.85	.30	2.25	.75
.90	.30	2.50	.85

We recommend the use of time-recording devices on all toll boards wherever practicable.

DIVISION OF TOLL REVENUE BETWEEN TOLL LINE COMPANIES.—In the division of toll revenue between toll line companies we recommend that after deducting the originating commission the remainder of the total toll tariff be divided between the connecting companies in proportion to the ratio existing between the air line distances from point of origin to the point of transfer, or switching point, and the air line distance from the point of transfer to the point of destination, each toll line company assuming the mileage of and settlement with its own connections.

NIGHT RATES.—We recommend the adoption of the following night rates between the hours of 6 P. M. and 6 A. M.:

Day Rate.	Night Rate.	Day Rate.	Night Rate.
$0.10	$0.10	$0.95	$0.50
.15	.15	1.00	.50
.20	.20	1.05	.55
.25	.25	1.10	.55
.30	.25	1.15	.60
.35	.25	1.20	.60
.40	.25	1.25	.65
.45	.25	1.30	.65
.50	.25	1.40	.70
.55	.30	1.50	.75
.60	.30	1.60	.80
.65	.35	1.70	.80
.70	.35	1.80	.90
.75	.40	1.90	.95
.80	.40	2.00	1.00
.85	.45	2.25	1.15
.90	.45	2.50	1.25

TARIFF DIVISION BETWEEN TOLL COMPANIES AND EXCHANGES HAVING NO TOLL MILEAGE.—We recommend that all stations originating toll messages be paid, as compensation therefor, a commission on all toll business originated whether sent paid or sent collect.

REPORTING TOLL BUSINESS.—We recommend that each exchange or toll line company make a monthly report embodying a full statement of business sent and business received by it to the toll line company with which its settlements are made not later than the 10th of the following month.

METHOD OF HANDLING TOLLS.—We recommend the adoption of the following general rules to govern the transmission of toll messages:

Toll operators at stations originating calls to answer calling subscriber by saying "toll" only. After subscriber gives name and address of party with whom he desires to converse, operator to ascertain name, address and telephone number of calling party, and immediately record same on a ticket furnished for that purpose. If a messenger is required to reach party wanted, or if there is a long delay, originating operator to report back to calling party. Operator at receiving station, when called, operator to answer by giving name of station only, and to record name and station of calling party; also name and address of party called. On completion of conversation both operators to record the following information on their respective tickets:

Time conversation commenced.
Time conversation was completed.
Amount of tariff.
Amount of messenger fee, if any.

and if charges are reversed, tickets to be stamped "reversed." Operators to immediately compare tickets on completion of call.

HANDLING OF FRANKED BUSINESS.—Operators to make a ticket for all messages sent and received; no ticket to be marked "deadhead."

All business subject to frank to be accounted for and reported in the regular manner as if paid tolls, and an adjustment of free business to be made between connecting companies in their general settlements.

TOLL STATIONERY.—We recommend that the association be empowered to purchase in wholesale quantities all necessary tickets. report blanks, special forms, routing and tariff books which may be adopted by the association, and that the association be empowered to furnish these to members of the association only, at actual cost with 10 per cent. added.

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TOLL ACCOUNTING.—We recommend the following general plan for accounting toll business:

All sent and received tickets to be grouped according to the station with which business has been transacted, one group for each station, and the summaries entered daily on a toll ledger prepared for that purpose. The information to be recorded as follows:

Amount of tolls sent paid.
Amount of tolls sent collect.
Amount of messenger fees collected
Total number of messages received.
Amount of tolls received paid.
Amount of tolls received collect.
Messenger fees paid.

At the close of the month the footings on daily toll ledger to be grouped on to a monthly check report, showing the totals of business between reporting station and each station to which it sends business and from which it receives business. This report to be used as a basis in settlement of business between connecting companies.

DIVISION OF TARIFF BETWEEN A GROUP OF COMPANIES AND A TOLL LINE.—We recommend the following plan for adjusting division of revenue between a group of companies operating in a limited district, each connected with the other, and one of which connects with a toll line and the connecting toll line:

For division of revenue treat the group of connecting companies as a toll line company, allowing the grouped lines, air line mileage from various originating points to the point where its line meets those of the toll line company, and allowing toll line company its mileage on the same basis, the toll line company to settle with the line with which it immediately connects, and this line (one of the group) dividing the net revenue which it receives from settlement with main toll line among the other lines comprising the group in proportion to the mileage the line has in.

We recommend the formation of local associations by short line companies connecting and operating in a limited district, in which case the association may be treated as a toll line company in making settlement with other toll line companies with which it connects.

In the division of tariff between two groups of short line companies the same general plan to apply, each group being considered as a toll line company.

FORMS FOR ACCOUNTING.—We recommend the adoption by the association of uniform toll tickets, daily toll ledgers, monthly check reports and subscribers' toll bills.

TICKETS.—For recording sent messages we recommend the adoption of a white ticket, approximately 3x4 inches, with space for telephone number of calling party, date, calling party's name, calling party's address, name of party called, address of party called, time conversation commenced, time completed, total minutes used, operator's number, amount of toll, amount of messenger, total charge for call, ticket to be printed "sent."

For recording received business use pink ticket printed "received," otherwise same as sent ticket.

DAILY TOLL LEDGERS.—Daily ledgers of 100 pages, alternate sheets to be perforated, size about 8x10 inches, ruled in columns as follows:

Offices.
Number of messages sent.
Overtime.
Tolls sent paid.
Tolls sent collect.
Messenger fees collected.
Number of messages received.
Overtime.
Tolls received paid.
Tolls received collect.
Messenger fees paid.

On head of each page should appear name of originating station and station from which business has been received, or to which business has been sent. A separate page in daily toll ledger to be used for each station with which reporting station does business, pages to have thirty-one (31) lines to enable reporting station to record on one sheet a full month's business between two stations.

MONTHLY REPORT BLANKS.—This report to contain a summary of a month's business of station, single sheets about 18x 11½ inches, to be headed as follows:

Check report of ..... office, month of ....., otherwise monthly check report to be ruled the same as daily toll ledger. This report to contain a summary of daily toll ledger sheets.

METHODS OF DETERMINING BALANCES DUE IN GENERAL SETTLEMENT.—We recommend the universal adoption of the following plan in arriving at settlements between exchanges and toll line and between toll line companies, company originating business to be charged with the following items:

Tolls sent paid.
Tolls received collect.
Messenger fees collected.

and to be given credit for the following items:

Messenger fees paid.
Commission.
Mileage, if any (as shown by mileage settlement).

SPECIAL COMMITTEE.—We recommend the appointment of a special committee, consisting of three, one of whom shall be a chairman, to whom all differences of opinion between connecting companies, relative to division of tariff, mileage allowances, etc., may be referred. This committee to act in an advisory capacity only.

COLUMBIA TELEPHONE MANAGER REPLIES TO HUME

IN reply to a recent interview concerning Chancellor Allison's decision in the matter of the Cumberland Telephone & Telegraph Company's standing in the State of Tennessee, made with Leland Hume, assistant general manager of the Cumberland Telephone & Telegraph Company, Dr. O. J. Porter, general superintendent and manager of the Citizens' Telephone Company of Columbia, Tenn., has written a letter in which he gives a history of his company and tells of the persistent efforts to destroy it made by the Cumberland Telephone & Telegraph Company. He says in part:

"When it was seen by the Cumberland Telephone & Telegraph Company's officers that the Citizens' Telephone Company in Columbia was likely to be a success, the Cumberland Telephone & Telegraph Company sent out an emissary, who made a house-to-house canvass, not only with the citizens of Columbia, but with the people throughout the county, and cut the rates to 50 cents per month for residences, not only in the town, but to citizens in the county, to whose houses they would have to erect telephone lines to supply the services. The emissary in many instances offered to put the instrument in the house and did put instruments in houses without requiring any pay whatever. At the same time he avowed that it was the purpose of the Cumberland Telephone & Telegraph Company to break down and crush out its weaker rival in Columbia, and that after they had done so the former rates would be restored.

"With respect to the statement made by Mr. Hume in his interview that our company had been going on from bad to worse, I beg to state that our condition has been improving steadily in every particular, our service is first-rate, and is better than that of the Cumberland Company. Our company is out of debt and is giving universal satisfaction to its patrons. It has more subscribers than ever before and is steadily increasing its list.

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"With respect to Mr. Hume's statement that propositions of an official character had been made to him in his capacity of general manager of the Cumberland Company to buy out the Maury county concern, I beg to state that this statement is totally without foundation whatever.

"Some two or three years after the bill had been filed in Nashville to oust the Cumberland Company from the exercising of franchises in the State, a written proposition was submitted by the Cumberland Company to the Citizens' Company to buy out our plant in Maury county, and give us more favorable rates, provided the suit pending at Nashville and recently decided should be dismissed. When it was known that this proposition had been made several hundred of the stockholders of the Citizens' Telephone Company assembled in the Opera House at Columbia, while Mr. Hume was at the Bethell House, nearby, awaiting the result of his proposition.

"When it was stated to this meeting of the stockholders of our company that a written proposition had been submitted by the Cumberland Company to buy out our company and its properties, the stockholders unanimously declared that they would not permit the proposition even to be read before the stockholders, and that they would not entertain any proposition to sell out to the Cumberland Company at any price or upon any terms whatever.

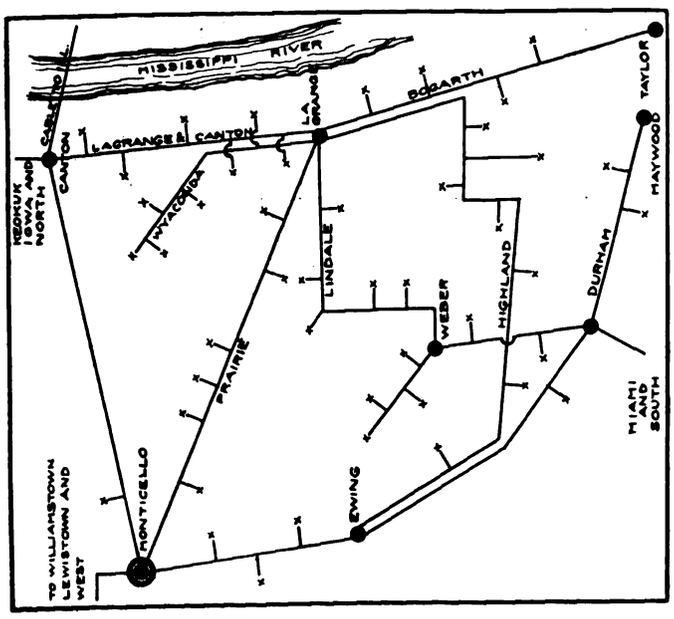
"With respect to Mr. Hume's statement that the last of the propositions was made only a few weeks ago and was bona fide, I beg to state that Mr. Hume came to Columbia and sent me word that he desired an interview with me. I sent word to him that if he desired to see me he would have to come to my office. When he reached my office he wanted to know if our company would make him a proposition to sell out our Maury county plant to the Cumberland Telephone & Telegraph Company. I told him that we would not do so, and he thereupon requested me to say nothing about this interview with me. I respected his request and did not say anything until he had perverted the facts.

"Mr. Hume states that our company makes frequent assessments on its shareholders. This is untrue."

TELEPHONE MAPS

By W. H. Elges.

THE use of maps and diagrams has been general in every engineering undertaking, and their value as a means for determining routes and methods of operations has been considered of the highest importance. It is therefore to be regretted that in the average telephone company their use has not been general, for nowhere is a more definite knowledge of a system required than in the details of a telephone system. Telephone companies that are growing fast, even if they have had maps of the territory that was originally covered, very often fail to keep them up-to-date, and consequently when a trouble occurs which it is necessary to clear quickly, a lineman is sent out to go over the line and often wastes much time before the fault is discovered. When a change is made in the management and a new man comes to take hold of the business, he is at sea as far as the



Map of Citizens' Telephone System, Lewis County, Mo.

routes of the different wires are concerned and it takes him some time to get acquainted with them, whereas if there was an up-to-date map in the office showing all the circuits, subscribers, and trunks, he would have no difficulty in getting posted upon the subject. Again, in many rural communities, a subscriber may call for another, simply giving the locality of a telephone without the number. If the manager has a map he can tell right away what the number is or how to go about making a connection. The accompanying diagram shows a map of the lines owned and operated by the Citizens' Telephone Company, of North Missouri, in Lewis County. The circuits shown are only country lines, and crosses indicate subscribers. If necessary, the names of the subscribers, together with their telephone numbers, could be marked upon the map. From the diagram it can be seen that Canton is directly connected with La Grange and Monticello, and direct lines run from Monticello to La Grange and Ewing. Other circuits can be readily traced out.

For the use of repair men, a map should be prepared showing through whose property and over what roads the lines run, and any other information should be given which would be of value in clearing trouble. Some large companies have expanded upon the map idea and have route books which show the poles and cross arms, and also indicate the pins upon which each circuit is mounted. In this way it is quite easy to construct a new line or to change over old ones to accommodate a new subscriber in a much quicker manner than would be possible without.

It is also very important that the poles where transpositions take place should be marked, because in building new lines the relation which the new line will bear to the old line so that it shall be free from inductive effects, depends entirely upon the position of the transpositions. In designing maps to cover certain territories, it is advisable to subdivide the service, so that whereas one map will give a general outline of the system, other maps will specify the distance of toll lines, and still others the subscribers within certain limits. All maps should be drawn to scale, otherwise their value is very much reduced; since it is evident that in locating a trouble upon a certain line, if there is a possible place where such a trouble might occur and the resistance test shows that this location is not the one where the trouble that is being looked for occurs, a great deal of time may be saved. Special note should be made of street railway and electric light circuits, and these should be kept up-to-date, so that as new telephone circuits are constructed the exact route may be mapped out before hand, so as to secure maximum efficiency out of the system without any of the faults due to hasty construction.

It has not been the purpose of the writer to deal with the theoretical advantage and practicability of maps, but to outline in a general manner what he considers to be the reasons for their usage and the best methods for applying them. It is evident that conditions will arise which will make a change in the general idea necessary, but, on the whole, the principle upon which the work is to be done is the same.

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LONG DISTANCE TOLL-ACCOUNTING.

ARTICLE I.

By C. L. Norton. *General Toll Accountant, United States Telephone Co., of Ohio.*

THE Independent telephone field demands a system for toll accounting that is simple in operation, yet accurate in detail. An important feature to a long-distance company is the prompt report to its main office of business transmitted over its lines. The returns should be in such order that the clerical work of checking for deficiencies can be accomplished in the least time.

A long-distance company may have connection with hundreds of local exchanges, and each local company must be furnished with a uniform set of instructions for handling and accounting that must render information, yet void of complication.

Every message that is transmitted must be recorded. The most feasible record is a toll message slip. Care must be exercised that the originating and terminating operators make a full record of each call. The omission of any item of information often causes irreparable harm, and the loss of a call for want of convincing data on a disputed message.

C. L. Norton.

On Jan. 1, 1904, a complete set of rules and instructions for the handling and accounting of long-distance tolls was inaugurated for the use of all local exchanges connected with the United States Telephone Company.

A local company with a supply of toll tickets, both sent and

Form 1005

THE UNITED STATES TELEPHONE CO.

SENT

No.____ DATE____ 190__

FROM ____

AT ____

TO ____

AT ____

TIME CONNECTED.	OPERATOR.
	No.
TIME FINISHED.	TOLL
	MESS'GR
MINUTES USED.	TOTAL

Fig. 1.

received, a toll ledger and a monthly toll report can make out a very complete report by following the instructions outlined.

Rules and Instructions.

Toll Tickets: Every message sent or received must be recorded on a toll ticket, great care being exercised that the originating and terminating operators check messages accurately and in harmony with the Routing and Tariff books. Spaces are provided on the toll tickets for full information necessary for recording each call. In each case every call is to have the full information, special attention being directed to "overtime," which must, in all cases, be charged and reported.

Tolls Sent Paid: Represents calls originating at a station, the charges of which are to be collected at the station forwarding same. These calls are reported on a white "sent" ticket, Fig. 1.

Tolls Received Paid: Represents calls terminating at a station, the charges of which have been paid and collected at the forwarding point. As much care is to be taken in recording these messages properly as of "sent" calls; otherwise false charges or credits will be created for or against a forwarding point. These calls are recorded on a pink "received" ticket, Fig. 2.

Reversed Messages: For the convenience of the public charges on originating tolls are permitted to be reversed to the receiving point. Necessary notations must be made on tickets representing this class of service, so that they may be distinguished from a regular call. Reversed messages are either "tolls sent collect" or "tolls received collect."

Tolls Sent Collect: Represents calls originating at a station, the charges of which are to be collected by the station receiving same. Great care must be shown in having a thorough understanding with the receiving point that the reversing of such charges are permissible, and that the collection of these tolls will be made. These calls are recorded on a "sent" ticket.

Tolls Received Collect: Represents calls terminating at a station, the charges of which are reversed and are to be collected by the agent at the receiving point. Necessary precaution is to be used so that the possibility of such calls becoming uncollectible is removed. These calls are recorded on a "received" ticket.

Messenger Fees Paid: This fee represents the necessary expense involved in obtaining patrons that are called on received messages. Before paying such fees the terminating station must ascertain to a certainty from the forwarding station that the amount will be paid; otherwise no credit will be allowed. Reversed messenger fee charges are absolutely prohibited. All such charges must be collected at the forwarding station.

Messenger Fees Collected: Represent the fees collected by a station and charged on originating calls in addition to the regular tariff. The utmost care must be used that the amount collected corresponds with the fee asked by the terminating station.

Charges for Messenger Service: Special attention is directed toward reducing messenger fee charges to a minimum, as in many cases excess charges of this nature have created a prohibitory rate for long-distance service.

Form 1005

THE UNITED STATES TELEPHONE CO.

RECEIVED

No.____ DATE____ 190__

FROM ____

AT ____

TO ____

AT ____

TIME CONNECTED.	OPERATOR.
	No.
TIME FINISHED.	TOLL
	MESS'GR
MINUTES USED.	TOTAL

Fig. 2.

Free Messages: It is of the utmost importance that every message of this description is checked the same as a full paid

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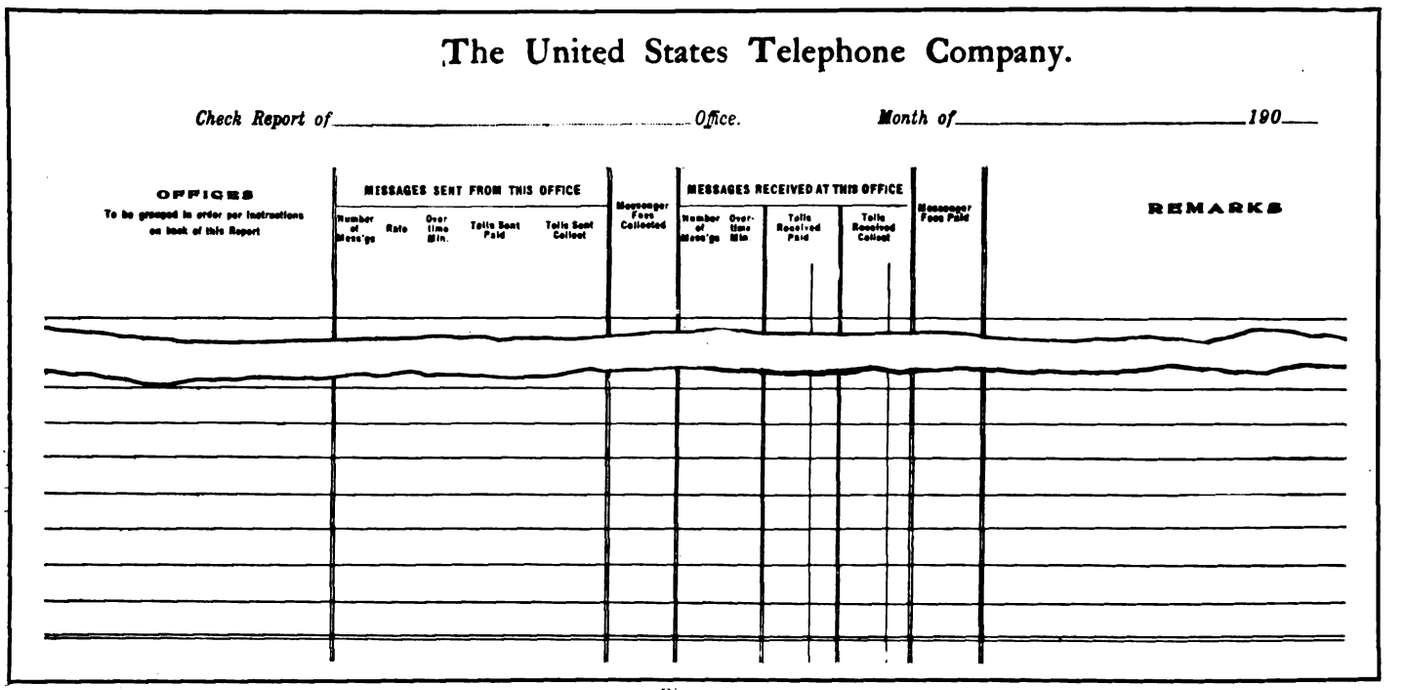
message. Before relief can be obtained from this debit an itemized bill covering such service must be sent to the general manager for his approval, immediate action will be given, and as soon as it is returned credit may be taken on the following month's toll report for the amount of such service that has been "franked," after the *originating commission has been deducted.* Charges on "free" calls must not be reversed.

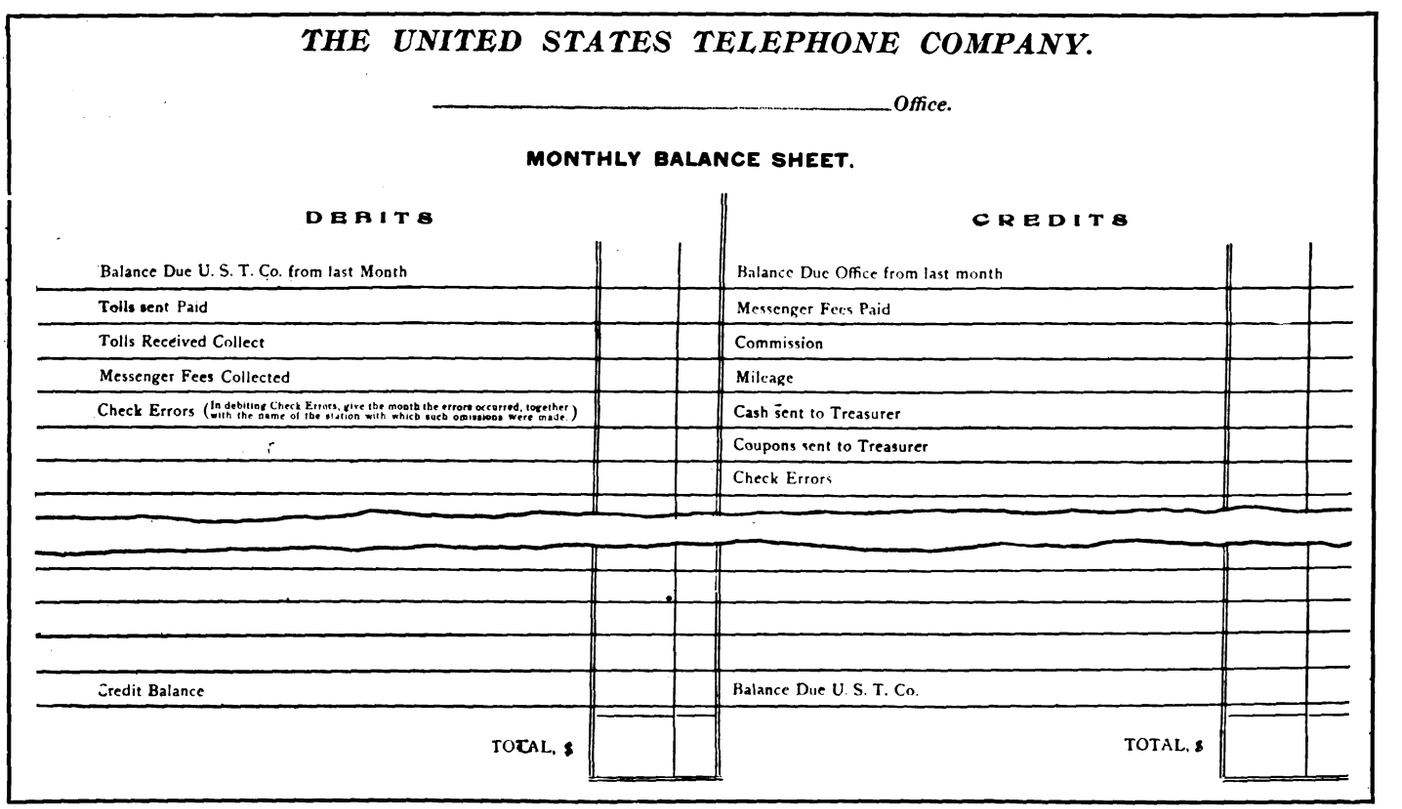

The United States Telephone Company.

Check Report of _____ Office. Month of _____ 190__

OFFICES To be grouped in order per instructions on back of this Report	MESSAGES SENT FROM THIS OFFICE: Number of Mess'ges	Rate	Over time Min.	Tolls Sent Paid	Tolls Sent Collect	Messenger Fees Collected	MESSAGES RECEIVED AT THIS OFFICE: Number of Mess'ges	Over-time Min	Tolls Received Paid	Tolls Received Collect	Messenger Fees Paid	REMARKS

Fig. 4.

DAILY LEDGER: At the close of each day's business toll tickets are to be recorded in the agent's daily ledger, Fig. 3. A separate page is to be used for each station's business, and each day's business is to be shown after the date that it was transacted. This ledger is also provided with duplicate perforated leaves; the carbon copies of which are to be detached and forwarded to this office, after the totals are carefully verified and recorded on the monthly toll report. This ledger is also provided with spaces for


THE UNITED STATES TELEPHONE COMPANY.

_____ Office.

MONTHLY BALANCE SHEET.

DEBITS			CREDITS		
Balance Due U. S. T. Co. from last Month			Balance Due Office from last month		
Tolls sent Paid			Messenger Fees Paid		
Tolls Received Collect			Commission		
Messenger Fees Collected			Mileage		
Check Errors (In debiting Check Errors, give the month the errors occurred, together with the name of the station with which such omissions were made.)			Cash sent to Treasurer		
			Coupons sent to Treasurer		
			Check Errors		
Credit Balance			Balance Due U. S. T. Co.		
TOTAL, $			TOTAL, $		

Fig. 5. Reverse Side of Fig. 4.

NUMBER OF MESSAGES.—This column to include the total number of all messages, both "sent paid" and "sent collect."

(B) Rate.—In this column the correct day rate is to be shown. If calls are sent or received "night rate" the number of such calls are to be shown in the overtime column in parentheses with the letter "N" marked after same. The number of these calls must also be included in the "number of messages" column.

(C) Overtime.—This column is to include all overtime shown in "minutes" that is consumed on a message.

(D) Tolls Sent Paid.—This column is to include both the amount of the first three-minute call and the cash amount of all

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overtime which is shown in "minutes" in the "overtime" column.

(E) Tolls Sent Collect.—This column is to include the amount of service explained as "tolls sent collect."

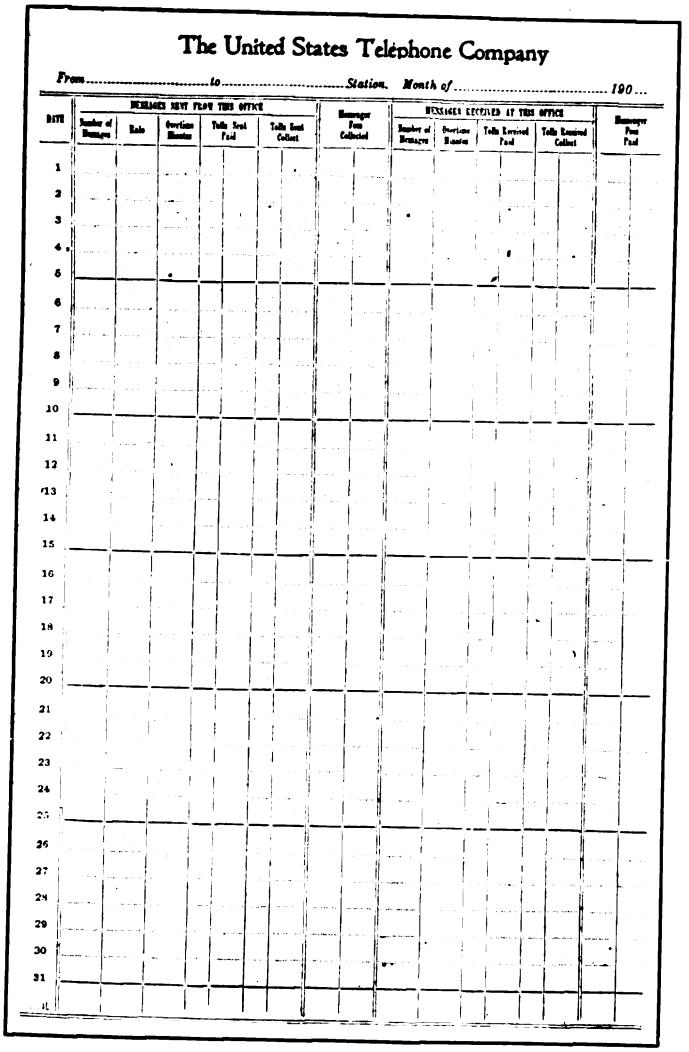
(F) Messenger Fees Collected.—This column to include the amount of all fees as per explanation of "messenger fees collected."

MESSAGES RECEIVED AT THIS OFFICE:

(A) Number of Messages.—This column to include the total number of all messages both "received paid" and "received collect."

(B) Overtime.—This column is to include all overtime shown in minutes that is consumed on a message.

(C) Tolls Received Paid.—This column is to include both the amount of the first three-minute call and the cash amount of all overtime which is shown in minutes in the overtime column.


The United States Telephone Company

From ..... to ..... Station. Month of ..... 190...

DATE	MESSAGES SENT FROM THIS OFFICE						MESSAGES RECEIVED AT THIS OFFICE				
	Number of Messages	Rate	Overtime Minutes	Tolls Sent Paid	Tolls Sent Collect	Messenger Fees Collected	Number of Messages	Overtime Minutes	Tolls Received Paid	Tolls Received Collect	Messenger Fees Paid
1											
2											
3											
4											
5											
6											
7											
8											
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30											
31											

Fig. 3.

(D) Tolls Received Collect.—This column is to include the amount of services explained as "tolls received collect."

(E) Messenger Fees Paid.—This column is to include the amount of all fees as per explanation of "messenger fees paid."

MONTHLY TOLL REPORT: The total of each station's monthly toll business is to be carried forward on the monthly report, Fig. 4. The stations are to be arranged in alphabetical order, taking care that all tolls, messenger fees, etc., are included in the columns designated for each individual service. The totals are then to be obtained for the monthly settlement.

BALANCE SHEET: The reversed side of the monthly toll report represents the monthly balance sheet, or settlement, and is divided into debits and credits, as shown in Fig. 5.

DEBITS:

(A) Balance Due U. S. T. Co. From Last Month.—Any balance due from the previous month, with the exception of check errors, is to be debited after this notation.

(B) Tolls sent paid.

(C) Tolls received collect.

(D) Messenger fees collected.

These three items represent the tolls and messenger service paid and collected at a station, and are known as "tolls collectible." The total of these three items must agree with the amount of the monthly toll bills.

(E) Check Errors.—In debiting check errors, give the month in which the errors occurred, together with the name of the station with which such omissions were made.

CREDITS:

(A) Balance Due Office From Last Month.—Any balance that is due an agent from a previous month is to be shown after this notation.

(B) Messenger Fees Paid.—After the necessary assurance is obtained that the amount of this service is correct, credit may be taken on the monthly toll report

(C) Commission.—A station is entitled to commission, only, on originating business which consists of "tolls sent paid" and "tolls sent collect," with the limit that the commission on any one message of three minutes' duration is not to exceed 12½ cents.

REIMBURSEMENTS: No credit is to be taken on the toll report other than specified in this circular, and further reimbursements can only be obtained by sending an authorized bill to the general manager's office, and if correct a check will be returned covering same.

TIME: A monthly toll report must be mailed to the general toll accountant on or before the 10th day of each month covering the preceding month's toll business. A check for the cash balance shown on the monthly toll report must accompany the report in every instance. Remit by post office order, express money order, check or draft.

These instructions bring the reports to the general office.

PLANS FOR SIOUX CITY EXCHANGE.

THE plans for the exchange building to be erected by the Sioux City, Iowa Telephone company are about completed. The estimated cost of the building is $25,000.

According to the plans and specifications the new exchange building is to be one of the very best of its kind. It will be as absolutely fireproof as it is possible to make buildings. The architects say that the only way fire can get into the building is through the front door. The building is to be of Portland cement, concrete construction. The framing will be of steel beams and columns, supporting concrete floors with thin surfaces of wood or ornamental tile flooring. The walls will be of hollow cement blocks with facing on the front elevation of ornamental brick and terra cotta. The base will be of cut stone.

The structure will be two stories in height, with a high basement, and will be of the French renaissance style of architecture. The first floor will contain the business offices of the company, the manager's office, the toll booths and a meeting room for the board of directors of the company and the necessary cloak rooms.

The second floor will contain the automatic switchboards and accessory machinery, an allowance being made for the accommodation of 7,000 subscribers. Provision will be made for an additional 3,000 subscribers on the first floor, so that the entire capacity of the exchange will be 10,000 subscribers. The arrangement of the switchboard will necessitate the placing of three continuous skylights the full length of the building, affording solely north light. The switchboard alone of the automatic variety, will cost $65,000.

The basement, besides a steam heating plant, a room for storage batteries and a power plant, will contain space for storage and surplus. The ground dimensions of the building will be 80 by 45 feet.

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OPPORTUNITIES OF THE PACIFIC COAST.

THE AMERICAN TELEPHONE JOURNAL is receiving many words of commendation and encouragement from Independent telephone operators who are successfully fighting the Bell monopoly in various parts of the country. Some of these letters are from men who are building up a large business in spite of fierce competition; others are from those not so able to successfully combat a great monopoly like the Bell, but who are "getting there" just the same.

A correspondent from Humboldt County, California, sends in addition some interesting facts relative to the field in his locality and the unusual opportunities it presents to Independents with ample financial backing. He makes an earnest plea for some one to go out there and take possession. The letter itself is worth reprinting; not only because of the really valuable information it gives to those who are seeking investment in the field of Independent telephony, but because it shows the stuff of which the men are made, who have been waging this great and winning fight against the Bell monopoly.

"We have one of the best fields for Independent telephone operation. With practically no thunder and lightning, no trees on street, no snow and sleet storms, cheap construction and maintenance, a rapidly increasing population, people exasperated and ready to revolt makes Humboldt County an ideal field for the Independent. This county has a greater area than the whole State of Connecticut, is situated in northern California with the only good harbor north of San Francisco for several hundred miles. The banner dairy and lumber section of the State, exceptional climate, neither hot nor cold, no snow and no irrigation needed. Geraniums and fuchsias grow and bloom in the open air the year around. Southern Pacific and Santa Fe are racing to get here. One city of 12,000 and another of 3,000, and many smaller towns. A grand opening for Independent telephone men. The whole coast has about 160,000, Bell and Independent. The Bell company has succeeded in keeping down all other companies in this county with one exception, and that exception is myself. With only five telephones, a few miles of wire and about one hundred dollars in coin in '92, I have increased the business unaided until I now have over 60 miles of wire and nearly 80 telephones, with orders galore. Now, if I can do that without capital or financial backing, what can others accomplish with the same spirit and a long sack to draw from? The Bell company has made me many flattering offers from the first, and until lately, when they gave me up as a bad job, so they have settled down to the old "scare" and "pinch out" game. Understand, I am not croaking. Wasn't built that way, but I would like to have some parties with capital and push come in and cover the other parts of the county. There is lots of room. I have only a small part of one end of the county, the larger and better part has not one Independent telephone. Eureka, with 12,000 population, is 12 miles from any of my telephones, claims about 1,400 telephones, and Arcata and vicinity, where I have a 50-year franchise, has nearly 150. That includes mine. Will gladly give any information to parties looking for a good field. Please understand I have nothing for sale, but will be only too glad to co-operate with any or all Independents."

"J. H. BLAKE,

"Box 229, Arcata, Humboldt Co., Cal."

A REPRESENTATIVE OF THE GREAT AND GLORIOUS COUNTRY.

We have heard much in the past of the "glorious climate of California" and the possibilities it offers to all who may come. But the effect of this climate on the telephone business is something which has not been sufficiently appreciated. Here is a county, just a mere county, larger than the entire State of Connecticut, into which Independents are so anxious to break. Here is a land that "flows with milk and honey," that is neither hot nor cold, in which the telephone girls can pick bouquets every day in the year. There are no trees to bother the wires, no snow and sleet to break down the wires, and better yet, no lightning to burn them out. Truly and in all seriousness, Humboldt County, California, presents an ideal opening for the Independent operator. Most of east and middle west have longed for the climate of California with a longing almost irresistible. They have seen great possibilities in the direction of fruit and comfort, but the idea of conducting a telephone exchange free from lightning and sleet and the thousand and one annoyances inseparable from the average climate seems like a vision of the promised land.

If California climate never did anything beyond developing such men as Mr. Blake, that would be much. A climate that will exhilarate a man to such a degree that he will embark in the telephone business in the face of Bell competition with five telephones and one hundred dollars in cash, is certainly not to be sneezed at. A climate that will produce such a man and give him strength of character and sturdy courage to successfully resist the blandishments and the open enmity of the relentless Bell monopoly is a climate which we should like to distribute around judiciously where it would do the most good.

THE AMERICAN TELEPHONE JOURNAL has made many references to the courage and ability of the men who have made the winning fight against Bell monopoly during the past decade, but no words of praise can speak louder than this simple statement of fact from one who surely knows whereof he speaks. This is the kind of stuff of which Independents are made. Such men as this have won the great central west away from the Bell and are getting a firm foothold even out on the Pacific coast.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

TERMINATION OF SERVICE CONTRACT—DAMAGES.

Our contracts for exchange service read that "in case the subscriber elects to terminate his contract before the same has expired he shall serve written notice upon the manager at any time upon the payment of rental and other charges earned in full to the date of surrender of equipment, and in addition one-half of the unearned rental for the balance of the term then existing." Can the subscriber be compelled to pay rental for one-half of the unexpired term as per contract, and if he refuses can we compel him, and what would be the method of procedure? Can he be compelled to pay for service, or in other words, can he consider that his service is discontinued before he has given the manager written notice, even though he has orally notified several other employees some days or weeks previously, it being stipulated in the contract that he is to give written notice? Please answer the above and any other suggestions which may come to your mind along this line, in the next issue of the JOURNAL.

THE above quoted provisions of your contract are perfectly binding and valid in law. When a party has made a contract and stipulated that it shall be terminated in writing, he can be held to it unless he takes the steps required by his agreement. You may therefore consider his contract as in force until you received the written notice in accordance with his contract and charge him for service until regularly notified of its termination. The relation existing between the company and the subscriber is that of landlord and tenant and the same law governs.

The subscriber may be compelled to pay rental for half of the unexpired term as per contract. The provision is really one for liquidated damages, the damages that the company would suffer from the breach of contract being uncertain in their nature and difficult of determination. The parties having agreed that the measure of damages shall be the rental for one-half of the unexpired term, the courts would accept their determination upon the subject. Your method of procedure to collect the rental for half the unexpired term would be by breach of contract.

SUBSEQUENT CONDITION OF WIRE NOT COMPETENT

THE Supreme Court of Appeals of West Virginia, in the case of Hannum vs. Hill, has held that in an action for personal injuries received by reason of the negligence of a telephone company in permitting its wire to be stretched so low down over the public highway as to be caught by a horse's feet in passing, it is not competent to prove the condition of the wire at that point months subsequent to the time of the injury complained of. The action was brought by W. H. Hannum against the Petersburg & Franklin Telephone Company, a partnership composed of various persons, and a judgment of $4,500 recovered. The case was reversed, not upon the point mentioned above, but on another point that is more technical than of interest to the telephone business.

Hannum v. Hill (W. Va.), 43 S. E. 223.

DYNAMITE IN POST-HOLES.

IN the case of Harp vs. Cumberland Telephone & Telegraph Company a judgment in favor of the defendant has been reversed by the Kentucky Court of Appeals. Plaintiff, who has been employed by defendant in setting telephone poles, was directed to complete the digging of a hole which had been partially dug by another employee who was present at the time, but failed to inform the plaintiff that unexploded dynamite, used in the work, had been left in the hole. The dynamite was concealed by mud and water which had collected in the hole, and plaintiff, without knowledge of its existence, commenced the work, and while engaged therein, was injured by an explosion. The court held that an instruction by the trial-judge to the jury, that plaintiff could not recover unless defendant or its agents in charge of the work knew, or by the exercise of ordinary care, could have known that unexploded dynamite remained in the hole, and failed to exercise such care, was erroneous since defendant's duty to furnish plaintiff with a reasonable safe place in which to work required it to know that there was dynamite in the hole, and to have removed it or warned plaintiff of the danger. The fact that the explosive was left in the hole by plaintiff's fellow-servant was held to be immaterial, since the presence of the dynamite rendered the hole an unsafe place for plaintiff to work. Harp vs. Cumberland Telephone Company (Ky.), 80 S. W., 510.

RESCUERS IN THE LAW.

POTTS AND WHITWORTH, employees of a telephone company, were engaged in stretching a line of that company upon its poles. In doing so, the line had to be passed above a span of an electric car system. Potts, upon the telephone pole, was holding one end of the wire, while Whitworth, upon the ground, was holding the other. Whitworth stumbled, and in doing so dropped his end of the wire, which fell to the ground, resting upon the span wire below, which, by reason of defective insulation in the hanger by which the trolley wire and the span wire were connected, was heavily charged with electricity. Potts, holding the other end of the wire, instantly received a shock, and fell head foremost, but his spurs caught on a spike on the telephone pole, and he hung suspended in the air, head downward, and was literally roasted to death. Whitworth ran to his relief, and, catching hold of the wire of his own company which he had been using, in a vain attempt to cut it was himself instantly killed. Mrs. Potts sued the electric railway company and recovered a judgment. Suit was then brought by the wife and daughter of Whitworth against the same company for damages. The defense of the company was that the deceased had been guilty of contributory negligence in attempting to save his friend.

The Supreme Court of Louisiana held that Whitworth, in going to the rescue of Potts, was not in fault, but was acting under a high sense of moral duty, and for his death while engaged in the performance of that duty, occasioned by the negligence of the electric railway company, it was responsible in damages. The court quoted with approval the following: "A rescuer—one who, from the most unselfish motives, prompted by the noblest impulsives that can impel man to deeds of heroism, faces deadly peril—ought not to hear from the law words of condemnation of his bravery because he rushed into danger to snatch from it the life of a fellow creature imperiled by the negligence of another. He would rather listen to words of approval, unless regretfully withheld on account of the unmistakable evidence of his rashness and imprudence. This, conscience and reason approve, and the best judgment of thoughtful and intelligent judges has declared it to be the law of the land." Whitworth v. Shreveport Belt Railway Co. (112 La.), 36 S. 414.

KNOWLEDGE BY SERVANT OF LIVE WIRES.

THAT an employee knew that there were live wires where he had to work does not affect his right to recover for an injury by one of them, where he was informed by his employer that they were safely insulated, and where he had no knowledge that one of them by which he was injured was not so insulated. What the proximate cause of the injury was, was held to be a question for the jury. Haworth v. Mineral Belt Telephone Co. (Mo.), 79 S. W., 727.

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IN THE OPERATING FIELD.

OPENING OF THE SALT LAKE CITY EXCHANGE.

THE new exchange of the Utah Independent Telephone Company at Salt Lake City, was thrown open for a reception and inspection previous to its opening for business, and some 4,500 persons took advantage of the opportunity to inspect the building and apparatus.

The entrance to the building was brilliantly illuminated with gas and electric lights and the interior was decorated with palms and ivy, with large bouquets of carnations on every mantel and desk. The color of the electric lights added to the decorations.

On the reception committee were Governor and Mrs. Wells, Mr. and Mrs. S. F. Fenton, Mr. and Mrs. N. W. Clayton, and several other people of social and financial distinction in Salt Lake City. The City Council attended the reception *en masse*. The visitors were escorted over the building and had the various appliances explained to them by Manager C. O. Harris.

The exchange opened for business on July 5th. This plant is one of the largest Independent systems in the West, and it is expected the number of subscribers will be far in excess of those of the Bell Company within a short while. The switchboard has an ultimate capacity of 12,600 lines of which 4,000 are at present equipped, and is of the latest Stromberg-Carlson central energy type.

THE CUMBERLAND AGAIN IN TROUBLE.

AT a recent meeting of the Louisville Fiscal Court the Cumberland Telephone & Telegraph Company was made the subject of a sharp resolution by this body which was adopted. When the question of paying a quarterly bill for certain service was called up Magistrate Shadburn said he wished to register an objection to the character of service rendered the county. He stated that the county's contract called for single or individual lines in every county institution, and at the residence of every county patrolman. However, he declared, many of these were party lines. He stated further that he had much difficulty in getting connection with these patrolmen when he wanted them, and offered a resolution that the individual lines be supplied or the company called upon to remove the party lines, which, it is claimed, should be replaced. Magistrate Velten amended the resolution so as to require the telephone company to remove its service from all county institutions inside and outside the city limits, including the courthouse, unless the objectionable party lines were removed. The resolution as amended passed without dissent.

SOME TWIN CITY FACTS.

THE Twin City Telephone Company, which operates in the State of Minnesota and the two Dakotas, is a reorganization of the old Mississippi Valley Company. Under the presidency of Mr. Moulton, the company has made wonderful improvements; beginning with 300 it now has 12,000 subscribers, which are increasing at the rate of nearly 3,000 a year. The gross receipts are approximately $410,000, which is sufficient to pay all expenses of operation, maintenance and depreciation, leaving a net surplus of enough to pay 6 per cent. dividend on the common stock.

About a year ago the same interests which own the Twin City Company, organized the Tri-State Company to build long distance lines in Minnesota and the two Dakotas.

In order to insure a close affiliation between the two companies, the Tri-State company bought one million dollars of the stock of the Twin City company. This not only insures a unification of the two companies, but the earnings of the Twin City company which now belong to the Tri-State company insure the latter company an income sufficient to pay a dividend on its common stock. In addition to this income from the Twin City earnings, there are also the earnings from the long distance lines, which will exceed those from the Twin City holdings. With new lines of the very best construction, reaching to every principal point in the State, the Tri-State company will take a position in the very foremost ranks of long distance companies in the United States. It is their intention to make their service so good and at such a reasonable price, that busines men throughout the northwest will find it cheaper to transact their business over the long distance lines of this company, than by any other agency.

The trunk lines owned by the Tri-State company and allied companies are as follows: From Minneapolis to Duluth 150 miles, branches of the same 100 miles. St. Paul to La Crosse being built, 130 miles; St. Paul, to Austin, 110 miles; St. Paul to Windom, 175 miles; Minneapolis to Grand Forks, being built, 400 miles, a total of 1,065 miles. All this except the branches of the line to Duluth is standard copper circuit construction of the very finest description.

BELL COMPANIES REVOLT.

THE Bryant and Geneva (Ind.) telephone companies, tired of isolation, have decided to abandon the Bell Company's toll lines, and after the first of August will be connected up with the Independent lines. This gives them connection with the Home Telephone Company's system in Portland, Ind., which was an end much desired by all concerned. As it was, Bryant and Geneva were the only Bell exchanges of any consequence in this part of the State, and whenever one of their patrons desired to talk to Portland, Decatur, Berne or any other point within a radius of 100 miles, he was compelled to pay a messenger fee besides having to wait indefinitely for the party to be located.

The patrons of the two systems have gained great advantage in thus getting connection with so many great Independent systems.

OKLAHOMA TELEPHONE ASSESSMENTS.

TELEPHONE companies have been divided into four classes for the purpose of assessment. Companies in the first class are assessed $30 per mile for the first wire and $5 for each additional wire. The second class rate is $25 for the first wire and $5 for each additional wire. The third class assessment is $20 for the first wire and $5 for each additional wire and the fourth class is rated at $15 for the first wire and $5 for each additonal wire.

THE USE OF THE COUNTRY TELEPHONE.

THE telephone in the country districts is proving itself a great aid to the traveling salesman. Where formerly it was necessary for him to travel from 10 to 40 miles to secure an order, now, by means of the local telephone, he can reach his party and find out whether there is any need of him to take the journey or perhaps be able to make a sale.

The extent of rural lines now in operation is so great that there is hardly a town or village in the country of any size that has not got communication with another by means of Independent lines. Farmers realize its value and perhaps appreciate it more than do city people, from the fact of isolation.

We hear from time to time of happenings in which the telephone has been the main factor, and its general use is becoming more and more apparent as people realize its time and labor saving value. The praise for this state of affairs is due entirely to the Independent movement, as before its advent into the field the Bell companies did not seem to care whether a country party

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had a telephone or not, and even if one was contracted for, it was at rates way beyond its value to the party subscribing, since the number of people he was able to reach was limited to a very small number.

HUMBOLDT COUNTY (CAL.) SYSTEM.

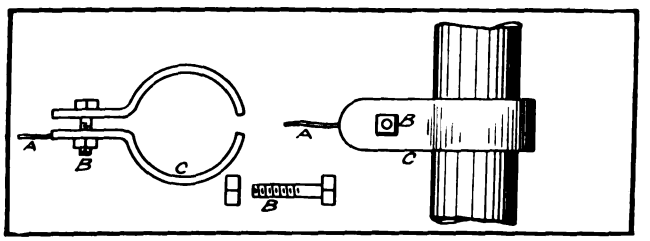
HUMBOLDT COUNTY, Cal., is rapidly coming to the front in the Independent field. The Blake telephone system, owned and operated by Mr. J. H. Blake, is one of the many progressive companies which have made the word Independent synonymous with good service and reasonable rates. Included in the territory this system covers are the towns of Arcata, Redwood, Alliance, Glendale, Blue Lake, besides several smaller places through which the lines pass to reach the outlying subscriber. The highest grade of construction and apparatus has been used,

EXTENSIONS OF TRI-STATE.

THE Tri-State Telephone Company, of Minnesota, has been actively engaged this year in building and extending its system. Recent arrangements have been made whereby it secures connection with the Winona Telephone Company, and the work on this new branch will be completed within a short while. Lines will also be built to La Crosse and Austin which will give connection to many towns along the Minnesota Southern Railway. A line is also to be built from Winona to Rochester, Owatonna, and Mankato, which will connect with Worthington, Windon, and give through connection with Sioux Falls, S. D.

GROUND CONNECTIONS.

GREAT difficulty is often experienced in making satisfactory ground connections to pipes. This is especially true where the wire is wrapped around, as it is often impossible to solder it. The following idea is suggested as a means to overcome this difficulty: The diagram is self-explanatory. The only suggestions that are necessary is that the pipe should be thor-



oughly cleaned and made as bright as possible before the brass clips are put on. The nuts and screws which come with dry batteries could be used when the battery is worn out for the purpose of fastening the clamps to the pipe.

Another excellent feature of this method of clamping is that it can be readily removed for cleaning at any time if necessary.

TELEPHONE EXTENSION IN THE NORTHWEST.

COMMUNICATION was formerly opened with Vashon Island, Washington, over the Skagit Farmers' Mutual Telephone Company's cable connecting Vashon Island with Seattle at the exchange of the Independent Telephone Company recently. Mayor Ballinger and a score of business men gathered at the Independent office in this city, while forty-five leading residents of the island congregated at the Vashon terminus to witness the opening of the new line.

The cable is four miles in length and extends from Brace's point on the mainland to Dolphin's point, on the northern end of Vashon Island. In addition to the office at Vashon, offices will be established at Lizabula, Aquarium and Burton.

A LARGE INDEPENDENT DIRECTORY.

GEORGE BLANDY, president of the Hawkeye Telephone Company, Des Moines, Iowa, is preparing to issue a telephone directory which will be out this fall and will be distributed to patrons of the Mutual Exchange, giving about 2,000 farm line addresses within a radius of 30 miles of Des Moines. Of these about 200 will be Polk County addresses.

The new directory will be of subscribers of the Hawkeye and of such other Independent companies in the Des Moines territory as have toll privileges with the Mutual. It is expected that before the issuance of the directory a schedule of cheap tolls for interchange of business between the patrons of the Mutual and the farm lines will be arranged.

THE LAW AND THE TELEPHONE.

AS a means to aid the law the telephone is rapidly coming to the front. Down in the State of Texas a safe was broken open and $900 stolen. There happened to be a bridging telephone in the place. The robbers were not evidently acqainted with the difference between a bridging and series instrument, for they cut one of the wires on the road. When the robbery was discovered the telephone was still operative in the other direction, and a party was communicated with in a town thirty miles away, where, fortunately for the people who had been robbed, the robbers went to catch a train. The party that was called up in this town happened to be standing on the platform, and was talking to an officer about the robbery when some men came up. The man told the officer they were strangers and told him to arrest them. It turned out that they were the robbers, and through the aid of the telephone they were convicted and sentenced two years.

THE MEINEMA SELECTIVE RINGING LOCKOUT TELEPHONE SYSTEM.

A SUBSTATION set to provide a selective lockout party line telephone, bearing the above name, was recently noticed in our patent columns. This device is now reported to be upon the market. Selection is accomplished by means of a step by step mechanism that is operated by a relay or electromagnet controlled by current pulsations which may be sent from any central source. The relay is carefully designed and constructed of the best material; while the step by step mechanism is made of hardened steel to insure long wear, all contact springs of German silver and provided with platinum tips for the actual contacts. A peculiarity of this system lies in the fact that only the ringing circuit is arranged to be selected, and ringing is accomplished over one side of the line and ground. Normally any telephone can be cut into the line by the mere act of removing the receiver; but when any line is in use, the line contacts of all the other telephones are thrown out of gear in such a manner that it is impractical to close the circuits of either the receiver or the transmitter, and by this means the device provides a secret system as well as one which is selective.

THE CUYAHOGA DEVELOPING.

THE Cuyahago opened its exchange for inspection and large numbers of Cleveland people took advantage of the opportunity to inspect the new equipment. This company is now giving splendid service and is securing new contracts at the rate of 250 a week.

The earning statement for June has not yet been completed, but it is thought that it will show a gain in gross earnings over May of $1,000. The May statement showed a gain over April of $1,200. The showing for June would have been much better but the company was handicapped for equipment for a week or so and was not able to keep up with the orders for new telephones. There is plenty of new equipment on hand now, however, and the new work is going on rapidly.

A TELEPHONE TANGLE.

"ARE you there?" Yes!"
"Who are you, please?" "Watt!"
"What is your name, please?" "Watt's my name!"
"Yes; what is your name?" "I say my name is Watt!"
"Oh! Well, I'm coming to see you this afternoon." "All right. Are you Jones?" "No; I'm Knott."
"Who are you then, please?" "I'm Knott!"
"Won't you tell me your name, please?" "Will Knott!"
"Why won't you?" "I say my name is William Knott."
"Oh, I beg your pardon."
"Then you'll be in if I come around this afternoon, Watt?" "Certainly, Knott."
They were rung off by the exchange. Now, what Knott wants to know is whether Watt will be in or not.

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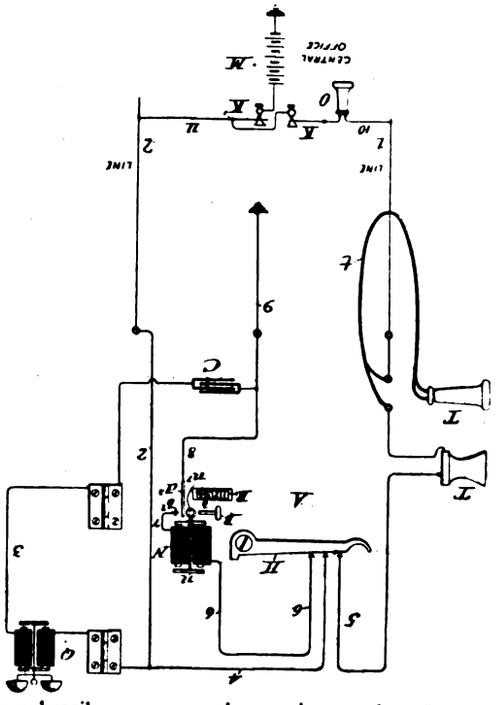
TELEPHONE PATENTS

IMPROVED CALL-REGISTER FOR TELEPHONE EXCHANGES.

J. W. Lattig, of West Bethlehem, and C. L. Goodrum, of Philadelphia, patent (No. 763,911) and assign to the Eastern Tel. Mfg. Co. of Westchester an improved telephone register, the essential features of which are shown in Fig. 1, which is a conventional diagram of the circuit. The central office is shown at *M*, while the subscriber's station is equipped with the transmitter *T* and the receiver *T'*, condenser *C* and call bell *Q* in the usual manner. The essential features consist in an electromagnet *N*, a push button *B* and a register *R* and a contact device *F* of the lever *D3* and a contact piece *D2*. When a call is to be



made the subscriber removes the receiver and pushes the button *B* which is under control of the electromagnet *M*. The operator is notified by the lighting of the calling lamp in the usual manner. She takes the order and obtains the desired party. When the desired party answers the operator presses the key *K'*, which sends current through the electromagnet *M*, releases the button *B*, which by means of a spring returns to its normal position, and returns by means of its backward motion. The plunger *B* rings the operator and at the same time operates the register *R;* thus a call is recorded and by the sound of the bell the operator is informed that a record has been made. The operator then completes the connection in the usual manner.

TRANSMITTER ARM.

H. J. Guttman, Chicago, Ill., patents (No. 761,671) an improved transmitter arm. The object of this device is to provide a transmitter arm made of pressed metal upon the end of which a cup, or proper receptacle can be formed into which the working parts of the transmitter may be placed.

COMBINED RECEIVER AND TRANSMITTER.

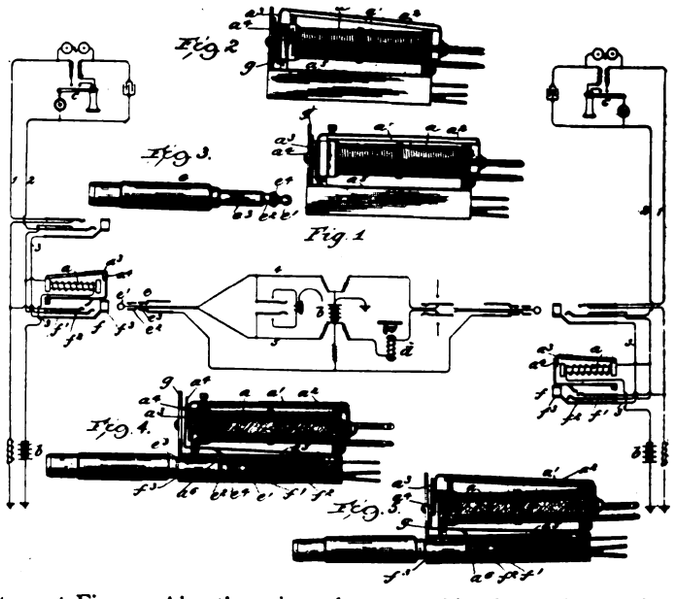
J. Gunnar Holmström, of Stockholm, Sweden, patents (No. 763,755) an improved combined transmitter and receiver, and assigns to Elektromilitára Aktiebolaget, of Stockholm, Sweden. In combination instruments difficulty has been experienced in the fact that the vibrations of the receiver diaphragm would be communicated to the transmitter diaphragm. In Mr. Holmström's device the respective diaphragms are separated by a cavity which is packed full of a substance which is a non-conductor of sound, such as mineral wool, felt, etc., and by this means one diaphragm is prevented from influencing another.

IMPROVED TELEPHONE RECEIVER.

James I. Gemmill, of Cleveland, Ohio, patents (No. 759,095), an improved telephone receiver. The object of this invention is to produce a receiver which is cheaper to manufacture and more durable in operation. The essential features consist in forming a bowl-shaped brass cup, to which both the pole pieces and the magnet of the receiver are bolted, and upon the face of which the diaphragm is placed.

SWITCHBOARD CIRCUIT.

Patent (No. 762,336) is granted to F. R. McBerty, of Evanston, and J. L. McQuarrie, of Chicago, and assigned to the Western Electric Company. This patent describes a self-restoring signal designed to operate both as a line signal and as a supervisory signal. This is shown in Figs. 2 to 5, inclusive, while the circuit is given in Fig. 1. An eltcromagnet, *a*, is drawn downwards. is pivoted an armature, *a'*. The front of this armature is bent downwards and forms the target, *a3*. Normally this target is above an opal in the plate, *g*, and is consequently concealed. If the magnet, *a*, is excited the armature, *a'*, is drawn downwards. Directly beneath the electromagnet is a line jack as shown in sec-



tion at Fig. 4. Also there is a plate, *a4*, which is so pivoted that when the plug is inserted this plate is caused to rise in front of the target. The plate, *a4*, is painted the same color as the plate *g*, and, consequently, the insertion of the plug causes the signal to disappear even though the magnet remains excited. When the receiver is replaced upon its hook the magnet, *a*, is de-energized, the armature, *a'*, then rises and takes a position in front of holes which are cut in the plate, *a4*. Thus the signal reappears and can be used both as a line signal and supervisory signal. The circuit of Fig. 1 indicates the method of installing a system of this kind in a switchboard and presents an exceedingly simple circuit.

TELEPHONIC MICROPHONE ATTACHMENT.

C. H. Viggars, of Milton, Mass., patents (No. 763,575) and assigns to Charles Bate, of Brockville, Canada, an improved device for collecting sound to be attached to a telephone transmitter. The inventor provides a transmitter to which a receiver may be attached by means of a cord and plug, and to the transmitter a large funnel-shaped arrangement is attached whereby the sound waves which are spoken toward the transmitter may be collected and caused to impinge on its diaphragm.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

POLE LINE.—(374.)

To save a long pole line we started to build across a marsh, but found out that we could not secure a solid line. Can you tell us if we can build a line through marshy ground and how. J. TEL. Co.

The most approved method of construction for conditions such as you mention is illustrated in Fig. 374. The earth should be excavated for about five feet deep, and planks about five feet long should be placed in the bottom of the hole, to make a flooring about four feet wide, then a log should be laid cross wise and

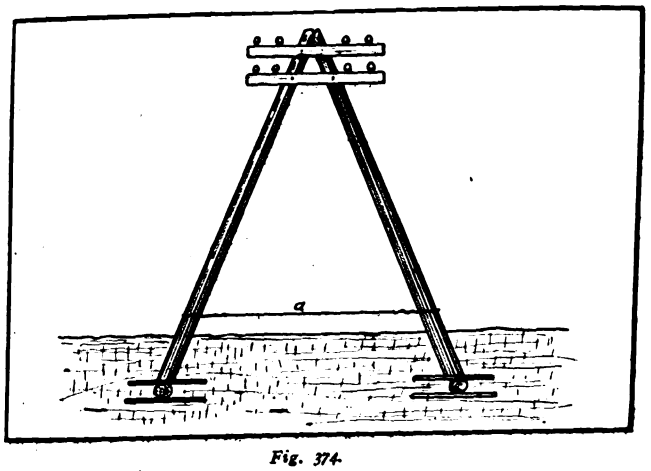

Fig. 374.

spiked to the planks. The space on either side to be filled with broken stones. Over this other planks should be placed and fastened to the log. The poles should be securely nailed to the cross pieces as well as to the log. On the top of the planks more stone should be placed. The two poles should be fastened with a tie wire, as at *A*, so that there will be as much resistance to a lateral movement as possible. In marshy ground, where there is any liability of the ground being inundated, this is the best method whereby the line can be securely protected and amply repays its additional cost in security

COMBINATION KEY.—(375.)

Will you please tell me whose make of key this is, and whether it is intended for both listening and ringing? A. C.

The key you illustrate, Fig. 375, is made by the American Electric Company and is a combined ringing and listening key. For

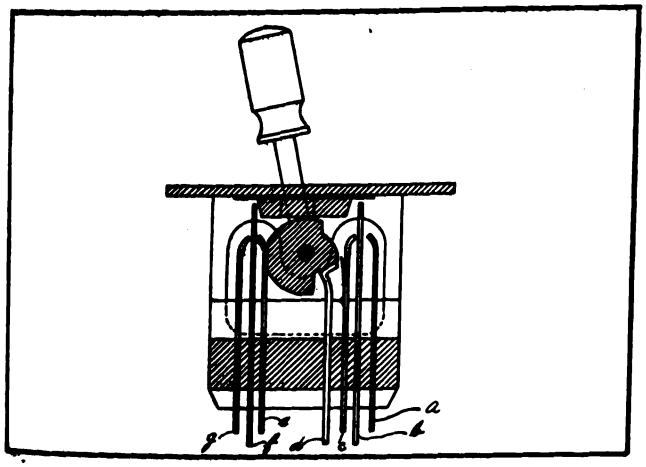

Fig. 375.

ease in illustrating we have only shown one side of the key, which represents one side of the circuit from tip to tip.

G and *a* are the ringing springs; *f* and *b* are the cord circuit springs being normally in contact with *e* and *c* which are strapped together. One side of the operator's set is connected to *d*, the other side not being shown. The hard rubber block underneath the face plate controls the ringing by opening the contacts of the cord springs from the connecting springs and closing them with the ringing springs according to which way the key is pulled. It is evident that ringing can be done both ways.

In listening the key is pulled part of the way, and to call it is pulled as far back as possible; to ring back it is pushed in the opposite direction.

LIGHTNING PROTECTION.—(376.)

We have experienced considerable trouble on account of subscribers on long bridged ground lines placing plugs on their telephones grounding same as a protection against lightning. Of course, this practice protects the telephone from damage, but subscribers frequently neglect to take the plug out when the storm is over, and one ground left on any telephone on a bridged line ruins the entire line until it is removed. We have equipped some of our bridged lines as per diagram enclosed. This arrangement of opening the wire with a knife switch certainly protects the telephone, and if a subscriber neglects to close the switch no other telephone is effected. We bring the ground wire from the telephone within a half inch of the knife switch and peel the insulation where the wire runs opposite to the switch. Do you consider this a safe practice? If not, state what objections. The switch is always placed on the eaves of the porch. W. T. C.

The method of wiring which you show does not embrace any protective device and so exposes the building to all the dangers

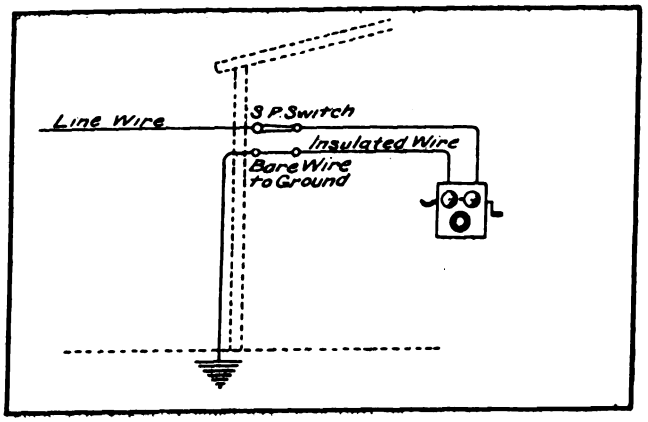

Fig. 376.

of unprotected wiring. We should consider it better general practice to equip the line with a good type of protecting device which would be more efficient in preventing injury from lightning, and would not be open to the objection of interruption due to carelessness on the part of the subscriber.

OHMMETER QUESTIONS.—(377.)

Will you please answer the following questions in regard to the home-made ohmmeter? How can a megohm be measured with it? How much battery voltage is needed with a galvanometer on a home-made ohmmeter, and will a special kind of galvanometer be required? J. T.

In answer to your first question a megohm can be measured with the ohmmeter in the same manner as any other resistance, although the instrument described was not intended to measure resistances at large and, consequently, when a high resistance is measured there is a probability of making a correspondingly greater error. The amount of battery which is desirable to use with the ohmmeter will depend upon the resistance to be measured. Low potential should be used with low resistance and high potential with high resistance.

CELL VOLTAGE.—(378.)

Why cannot more than two or two and one-half volts be obtained from a battery? N. R.

The reason why more than 2½ volts cannot be obtained from a battery is one of the inscrutable mysteries of nature, the reasons for which are unknown.

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THE WEEK'S MESSAGES

FINANCIAL.

CHAMPAIGN, ILL.—The Home Telephone Company has increased its capital stock from $25,000 to $100,000.

PITTSFIELD, ILL.—The Pike County Telephone Company has increased its capital from $50,000 to $75,000.

TUSCOLA, ILL.—The Tuscola Telephone Company has increased its capitalization from $5,000 to $10,000.

MAUCKPORT, IND.—The Eureka Telephone Company of Mauckport has increased its capital stock from $10,000 to $25,000.

AFTON, IA.—By a unanimous vote of the stockholders of the Afton Mutual Telephone Company, the capital stock has been increased from $12,000 to $25,000. The officers are: O. B. Emerson, president; J. W. Coen, secretary.

CLINTON, IA.—The Tri-City Telephone Company, of Clinton, has filed a deed of trust for $80,000 given to the American Trust and Savings Bank of Chicago, and Frank A. Jones, trustees.

ALMA, MICH.—The stockholders of the Union Telephone Company have authorized the Board of Directors by a vote of 99 per cent. to increase the capital stock of the company from $400,000 to $500,000. Of this amount $50,000 becomes immediately available for enlarging the company's exchanges and extending the toll lines.

NEW YORK, N. Y.—The Hudson River Telephone Company has declared its regular quarterly dividend of 1½ per cent.

TIPPECANOE CITY, O.—The Tipp Interurban Telephone Co. has increased its capital stock from $10,000 to $30,000.

PHILADELPHIA, PA.—Keystone Telephone Company's net earnings for the quarter ended June 30, 1904, were $86,240, against $53,987 for the corresponding period of 1903.

EL PASO, TEX.—The affairs of the Southern Independent Telephone Company, which was some time ago placed in the hands of a receiver, have been settled up and the receiver discharged, all of the creditors having been settled with and consenting to the action.

FRANCHISES.

SAN PEDRO, CAL.—W. H. Hyatt, a local attorney, has filed application with the city council for a franchise to install a local telephone system.

SANTA ROSA, CALIF.—The Board of Supervisors of Sonoma County have granted a franchise to John R. Denman, John H. Coltoft and Ernest Ormsby.

COLORADO SPRINGS, COLO.—Alderman Holden, at a recent meeting of the city council, introduced a new telephone ordinance granting a franchise to certain citizens. It was referred to the ordinance committee.

HAWARDEN, IA.—The Hawarden Telephone Company has been granted a franchise in Rock Valley.

RUMFORD, ME.—E. F. Elliott and other residents of Rumford have petitioned the selectmen for a telephone franchise.

SWANSEA, MASS.—George W. Fish and others are endeavoring to secure a franchise for the Automatic Telephone Company in Swansea.

HOUGHTON, MICH.—The Automatic Telephone Company has applied for a franchise in this city and will also endeavor to secure one in Lake Linden.

ALEXANDRIA, MINN.—The Merchants Telephone Exchange Company has been granted a franchise by the city council of Alexandria to construct its system in this city.

HERKIMER, N. Y.—The County Telephone Company will install a 10 station intercommunicating system in one of the large offices in the city.

ALBANY, ORE.—N. D. De Varney, of Kansas City, has secured a franchise from the city council for the construction of a telephone system here.

LOCKWOOD, PA.—The Lockwood Telephone Company, of which G. W. Bingham is president and secretary, and Edward Bingham, treasurer, is constructing a rural line from Lockwood to Waverley.

WATERTOWN, S. D.—The city council has granted a renewal of franchise to the Dakota Central Telephone Company.

MONTPELIER, VT.—The Orange County Telephone Company, recently organized, has petitioned the city council for privilege to erect poles and string wires from its central office to connect its stockholders.

HUDSON, WIS.—The Farmers and Merchants Telephone Company has applied for a franchise to construct a telephone exchange in this city.

POUND, WIS.—The town board has granted a franchise to the Farmers and Merchants Telephone Company, of Lena.

ELECTIONS.

GRANVILLE, ILL.—The Granville Telephone Company has elected the following officers: President, W. B. Sill; vice-president, A. D. Fisher; secretary, W. B. Blosser; treasurer, W. P. Mayer. The directors include the officers and C. M. Chase, John Kunkle, W. E. Hawthorne, C. W. Dysart and Olaf Matson.

KEWANEE, ILL.—The Kewanee Home Telephone Company has elected the following directors: W. I. Hobbs, Joseph L. Dunn, E. B. Long, A. C. Shoemaker, W. H. McMillan, F. A. Ellithorn, B. C. Allen and G. B. Thompson.

MADRID, IA.—The People's Telephone Company has elected the following officers: T. I. Dresser, president; J. S. Kennison, vice-president; John Van Zandt, secretary and manager; Oscar Oakleaf, treasurer. The capital stock of the company is now $15,000, but it will have to be increased by at least $4,000 or $5,000. A seven per cent. dividend was declared.

TRUMP, MD.—The Union Telephone Company, of Trump, has elected the following officers: C. L. Almony, president; S. S. Van Trump, secretary, treasurer and manager; Dr. W. Millard Stirling, James P. Jordan, G. G. Winemiller, executive committee. The capital stock of the company will be increased and the lines extended to Freeland and Bradenbaugh.

COMBINATIONS.

FARMINGTON, ILL.—The stockholders of the Farmington Citizens Mutual Telephone Company have purchased the Lafferty division, known as No. 9, running from the water works to Lerna. This line has 40 or more telephones. J. R. Grissamore, manager of the line at Farmington, will be made manager of the new system.

TAMPICO, ILL.—The Farmers' Telephone Companies of Tampico and vicinity, have merged into one company. The following officers were elected: L. A. Wheelock, president; Otto Nelson, secretary; E. A. Emmons, treasurer. The new company embraces practically all the farmers' lines merged at the central at Tampico including Prophetstown and Rock Falls lines.

GUILFORD, IND.—A company has been formed, to be known as the York Ridge Telephone Association which has purchased the telephone line owned by Dr. W. A. Schooley. The following officers were elected: M. Zimmer, president; F. W. Buchanan, secretary; C. P. Ward, treasurer. The line has been repaired and will extend to New Alsace and Weisburg, with connections to Indianapolis and other points.

KENTLAND, IND.—Messrs. Dixon and Jessen, owners of the telephone exchanges at Brook and Morocco, have purchased the Independent Telephone Exchange from W. K. McGray.

MASON CITY, IA.—F. A. Ansberry has purchased the telephone exchange formerly owned by Greenlee & Ansberry.

STRATFORD, IA.—Allen Cox has purchased the Chamberlain Telephone line from Stratford to Linnburg.

CONCORDIA, KAS.—The Concordia Telephone Company has sold its exchange at Jamestown, Kas., to residents of that place. The company of the Jamestown exchange will be reorganized and will be known as the Jamestown Telephone Company.

BELLAIRE, O.—The rumor that the Ohio Valley Telephone Company has been purchased by unknown parties is denied.

TOWANDA, PA.—The Canton-Le Roy Farmers' Mutual Telephone Company has connected with the Beech Flats and Grover system.

FERRIS, TEX.—The local telephone exchange has been purchased by Charles Farrer. It is his intention to extend lines to Red Oak, Rockett, Lancaster and Palmer.

PARKERSBURG, W. VA.—The West Virginia Western Telephone Company has purchased the plant of the Marietta Telephone Company and the two concerns will be consolidated under the name and management of the former company. It is expected that A. C. Davis will be general manager. The price paid was about $80,000.

PERSONAL.

FRANK L. BILLS, the Independent telephone promoter, is at present in Chicago. He expects to leave for Sioux City, Iowa, to look after his interests there within a few days. Mr. Bills reports the Independent outlook as being excellent.

W. H. CRUMB is at present in Hot Springs, where he installed the Independent telephone exchange. Under Mr. Crumb's able direction the system has nearly 1,000 subscribers, whilst the Bell has dropped from 800 to 570.

B. L. FREEDY, manager Northwestern Telephone Company's Exchange at St. Paul, has been appointed general superintendent of the company at Minneapolis. He will be succeeded in St. Paul by R. H. Woolfolk, of the Stillwater Exchange. C. P. Donelan will take charge at Stillwater.

T. P. JORDAN, of Dallas, Tex., has invented a phantom circuit, which he has successfully used over the lines of the Grayson County Telephone Company between Sherman and Dennison.

H. R. KING, designing electrical engineer of the Western Electric Company of Chicago, was married on June 21st at Leadville, Colo., to Miss Irene Baker.

J. P. McGAHAN has been appointed manager of the Central Union Company's Exchange at Youngstown.

R. S. MUELLER, of Chicago, has been appointed manager of the Cleveland branch of the Kellogg Switchboard and Supply Company, to succeed A. B. Kartz.

B. TIRRELL, formerly night operator of the Grand Block Exchange, of the Massachusetts Telephone Company, has resigned his position to become an aeronaut.

E. WILLIAMS has been appointed manager of the East Tennessee Telephone Company's exchange at Bristol.

MISCELLANEOUS.

BLOOMINGTON, IND.—The Bloomington Telephone Company has decided to expend about $25,000 in improving its system. One important feature of the work will be the raising of the wires above the electric light wires throughout the streets.

DETROIT, MICH.—President W. A. Jackson of the Michigan State Telephone Company says that 1,000,000 pounds of copper wire will be used in new construction by the Michigan State Telephone Company this year. The company now has 40,000 miles of copper metallic telephone lines in Michigan and to these circuits will be added 4,000 miles before next fall. The Michigan State Telephone Company has started work in the Michigan copper district on a radical series of improvements. The company has an investment of $300,000 in the copper country, and intends spending $75,000 more in making the proposed changes.

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THREE RIVERS, MICH.—The Three Rivers Telephone Company is expanding its toll line service, and has placed toll stations at Flowerfield and Howardsville.

EGG HARBOR, N. J.—The Egg Harbor City Telephone Company has commenced business with 25 subscribers.

BEAUMONT, TEX.—C. C. Conroy has disposed of his property, it is reported to H. E. Huntington. This property consisted of the Beaumont & Northwestern Telephone Company.

PRENTICE, WIS.—C. W. Macomber is reported to have bought the local telephone system.

UNDERGROUND.

ATLANTA, GA.—The Southern Bell Telephone and Telegraph Company will petition the city council at its next meeting for permission to construct subways for underground wires in several streets.

BURLINGTON, IA.—The Iowa Telephone Company is arranging to put its wires in Burlington underground.

WINONA, MINN.—The Northwestern Telephone and Telegraph Company has asked permission to construct several underground conduits.

WEST CHESTER, PA.—The Delaware & Atlantic Telephone Company has been granted permission to run all its wires underground.

NEW COMPANY NOTES

BELLAIRE, ILL.—The Louis Bellaire Telephone Company has been incorporated, with a capital stock of $5,000, by L. M. Biggs, J. C. Farley and E. M. Wiman.

CEDARVILLE, ILL.—The Stephenson County Farmers' Telephone Company is being promoted by C. Z. Dillenbeck, and will operate farmers' telephone lines in Stephenson County.

FRANKTON, IND.—The Farmers' & Citizens' Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are: George F. Quick, Thomas Bromley, Jr., Ernest H. Phillips.

HARRISTOWN, IND.—The Harristown Telephone Company has been incorporatod with a capital stock of $14,000. The company will install an exchange in Harristown and lines throughout Washington County. A. B. Cramer, E. P. Norris and others are the incorporators.

IDAVILLE, IND.—The Idaville Telephone Company has been incorporated, with a capital stock of $9,000, by T. B. Ginn, F. J. Royer, W. A. Bryan, G. B. Tam and others.

WILMOT, IND.—The Wilmot Mutual Telephone Company has been incorporated with a capital stock of $10,000, by L. R. Gerrald, J. W. C. Scott, H. T. Kline.

CUSHING, IA.—The Cushing Independent Telephone Company has been incorporated here with a capital stock of $50,000. The incorporators are O. H. Freeman and others.

LAKE PARK, IA.—A rural telephone company has been formed here, with George Lenz as president and C. C. Gregory secretary.

PANAMA, IA.—The Farmers' and Merchants' Mutual Telephone Company has been incorporated with a capital stock of $50,000. N. J. Roundy is president and W. E. Bliven secretary.

SHELLSBURG, IA.—The Farmers' Mutual Telephone Company, of Shellsburg, has been incorporated with a capital stock of $10,000. The officers are J. D. Hagan, president; J. S. Boles, secretary, and J. A. Viles, treasurer; J. D. Hagan, J. M. Heath, D. K. Johnson, E. W. McCully, Daniel Sherman, James Maxon, H. Dickinson, J. W. Miller and A. Muchanek, directors.

STANHOPE, IA.—The Stanhope & Griffen Telephone Company, of Hamilton County, has been incorporated with a capital stock of $1,000.

ARCADIA, KAN.—The Arcadia Telephone Company has been incorporated with a capital stock of $2,500 and will soon begin construction work.

WHITE PLAINS, KY.—The White Plains & Red Hill Telephone Company, of Hopkins County, has been incorporated with a capital stock of $500 by W. L. Moore, R. T. Gunn and B. F. Dukes.

CLARKFIELD, MINN.—The Clarkfield Telephone Company has been incorporated with a capital stock of $5,000.

DASSEL, MINN.—The Dassel & Collinwood Telephone Exchange Company has filed articles of incorporation, and work has been begun on several rural lines.

WHEATON, MINN.—The Lake Valley Co-operative Local Telephone Company has been incorporated with a capital stock of $10,000 by John A. Nonson and others.

BAY ST. LOUIS, MISS.—The Citizens' Light and Telephone Company, of Bay St. Louis, has been incorporated with a capital stock of $40,000.

ST. LOUIS, MO.—The Suburban Telephone Company has been incorporated, with a capital stock of $100,000, by W. L. Travers, of St. Louis; J. P. Phelan, of Wellston, and others.

FULLERTON, NEB.—The Citizens' Telephone Company, of Fullerton, has filed articles of incorporation. The capital stock is $10,000, with $5,000 paid up.

NEWPORT, NEB.—The Farm and Home Telephone Company, of Newport, has been incorporated, with a capital stock of $5,000, by C. M. Thompson and G. E. Van Every.

OAKDALE, NEB.—The Cedar Mutual Telephone Company, of Oakdale, has been incorporated with a capital stock of $5,000.

CORNING, N. Y.—The Hornby Telephone Association, of Corning, has been incorporated, with a capital stock of $2,000, by H. J. Jumerson and A. C. Gifford, of Corning, and W. T. Davis, of Hornby.

CHATHAM, OHIO—The Chatham Mutual Telephone Company has been incorporated, with a capital stock of $100,000, by A. B. Horst, John Yoder, Jr., W. H. Ripley, D. A. Clapp and A. R. Clapp.

FOSTORIA, OHIO—The West Mill Grove Telephone Company, of Fostoria, has been incorporated, with a capital of $3,000, by W. W. Rosendale, C. D. Stearns, J. P. De Wolfe, J. C. Rhodes and S. S. Ghastel.

WREN, O.—The Wren Telephone Company has been incorporated, with a capital stock of $10,000, by J. L. Moser, F. M. Lichtensteiger, B. O. Jones, L. M. Harmon, O. J. Harmon and E. L. Sheets.

CRESTON, PA.—The stockholders of the Cambria County Telephone Company met recently to consider the question of issuing $10,000 preferred stock. The company contemplates a number of improvements, including the extension of lines, and the new stock will be issued to bear the expense.

CONWAY, S. C.—The Conway Telephone Company has been incorporated, with a capital stock of $3,000, by Robert Scarborough and others.

BROWNSVILLE, TEX.—The Brownsville Telephone Company has been incorporated here with a capital stock of $10,000. Telephone service will be given the towns of Brownsville and Matamarot, Mexico. The officers are: B. G. Stegman, president, treasurer and manager; James B. Wellt, vice-president; Frank W. Kibbe, secretary.

HATTON, WASH.—A telephone company has been organized here by O. N. Campbell, A. L. Phelps and H. Sanders. Construction on a line west of the town, connecting with Sand Hills, Line, Kaholutus and Ritzville, will be begun immediately.

CONSTRUCTION.

NEW WESTMINSTER, B. C.—The New Westminster & Burrard Inlet Telephone Company has changed the route of the telephone line to Blaine, Washington, bringing it around by way of Cloverdale.

CAMPBELL, CAL.—The Grange is endeavoring to establish a telephone system at this place.

WASHINGTON, D. C.—Consul-General Richard Guenther, at Frankfort, Germany, reports to the State Department that new telephone lines are to be constructed from Madrid, Spain, to the French border; from Madrid to Galisha, via Santender; from Madrid to Malaga and Cadiz; from Vich to Manllen; from St. Vincent de Torello to Ripoll, and from Elche and Novelas to Pinoso and Cravillente. For particulars apply to Direccion General de Teleghaphos, Madrid, Spain.

CALEDONIA, ILL.—The Badger State Telephone Company will connect with Rosco and Beloit as soon as possible.

CONVERSE, IND.—M. A. Snyder, secretary of the Kokomo Telephone and Electric Manufacturing Company, of Kokomo, Ind., and J. W. Golding, manager of the Sims plant, were in Converse recently with a view to establishing an Independent telephone company giving through service to Sims, Greentown, Amboy and Plevna.

WARSAU, IND.—The Commercial Telephone Company, of Warsau, is building twenty-five miles of telephone line in the rural districts to connect with their exchange in this city.

FORT DES MOINES, IA.—The Hawkeye Telephone Company will install an exchange here.

JEFFERSON, IA.—The Jefferson Branch of the Farmers' Telephone (Mutual) Company has decided to supply the local telephone service. It expects to install at least 100 telephones.

LAKE PARK, IA.—K. G. Chrysler and J. H. Lemuel have a contract for the construction of a rural telephone system here.

STRUBLE, IA.—The Le Mars Telephone Company is constructing lines east and west of here.

CHASE, KAN.—The Farmers' Telephone Company, of Chase, expects to connect 100 more farmers' telephones as soon as harvest is over.

LINCOLN, KAN.—The Lincoln Telephone exchange will install a new switchboard soon. The company reports a very heavy business.

CRUTCHFIELD, KY.—The Local Telephone Company is constructing a telephone system which will reach all the farming districts within a radius of eight miles from here.

MADISONVILLE, KY.—W. H. Settle, who was given a franchise for the construction of a local telephone system recently, is stated to be making arrangements now for the construction of his system.

BLAINE, ME.—W. H. Hackett, of Robinson, and G. M. Young, of Blaine, were at Presque, Iowa, recently, in the interests of the Farmers' Telephone Company recently organized here. It is probable that a line will be constructed to Presque, Iowa.

PORTLAND, ME.—The Mt. Mica Telephone Company is extending its system to Buckfield.

SPENCER, MASS.—Henry Wilson, Peter Richards, A. M. Caldwell, Albert Clark, Louis Freeman, W. C. Bemis and others will petition the selectmen for a franchise to construct necessary lines to give them telephone service.

EMMETT, MICH.—A new telephone company has been formed here and the line is being constructed from the main office in this village to connect with Marshall, Battle Creek and other points.

PEMBINE, MICH.—A new telephone line will be constructed from Wausaukee to Amberg and Pembine at a cost of about $2,000. At Pembine the line will connect with Menominee Range system of Iron Mountain.

BERTHA, MINN.—A telephone line will be constructed from here to Long Prairie.

CLIFFORD, MINN.—The Clifford Telephone Company proposes to construct a line from Clifford to Perham.

DUNDEE, MINN.—A rural telephone system will be constructed here.

HAMBURG, MINN.—A telephone line will be constructed from this place to Green Isle.

MANKATO, MINN.—The Citizens' Telephone Company is constructing a line from St. Claire to Medo.

MONTGOMERY, MINN.—The Farmers' Telephone line is being constructed in connection with the local telephone exchange of the Cannon Valley Telephone Company of Waterloo to Derrynane and St. Thomas.

OWATONNA, MINN.—The Merton rural telephone company has been organized to build a line from this town to Merton.

STILLWATER, MINN.—Work has commenced in building a rural telephone line south from Stillwater to Afton.

WABASH, MINN.—The Plainview Telephone Company will put in an exchange here.

WADENA, MINN.—The Central Minnesota Telephone Company will rebuild the local exchange.

BENBOW, MO.—The citizens of Benbow held a meeting recently for the purpose of organizing a new telephone company to construct a local system.

LA GRANGE, MO.—A hail and wind storm passed south of this place recently, injuring several telephone lines.

GRANITE, MONT.—A telephone line will be built from this place to Red Lyon by William McIntyre.

BLUE SPRINGS, NEB.—The Gage County Independent Telephone Company has commenced construction on two new lines, one running south into Kansas and the other west to connect with line No. 6, already in operation in the western part of the county.

CHAPPELL, NEB.—The Oshkosh Telephone Company is erecting a telephone line in this town.

FALLS CITY, NEB.—The Falls City Telephone Company is contemplating many improvements. J. H. Morehead has just been made general manager of the company. A new line is being constructed to connect with the Hiawatha lines, which will give connection with this city.

NEWBURGH, N. Y.—The Highland Telephone Company has several contracts for new telephones and will extend its lines from Little Britain to Newburgh.

UTICA, N. Y.—The Utica Home Telephone Company is getting ready to put in 8,000 feet of underground cable and to enlarge its main distributing rack. The addition to the switchboard, which accommodates over 800 additional subscribers, is nearly completed.

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TRADE NOTES

STERLING ELECTRIC COMPANY, Lafayette, Ind., has secured the contract to furnish the Standard Oil Company, of Albany, N. Y., with one of its latest type of private branch switchboards.

THE CENTURY TELEPHONE AND MANUFACTURING COMPANY, of Buffalo, N. Y., has issued a folder describing its "Tungsten special" No. 65 telephone, its Platinum electrode transmitter No. 5, and also its Perfection receiver and Century desk set. Special claims are made for all this apparatus, and to those interested a copy will be sent upon request.

G. M. GEST, the expert subway contractor, of New York and Cincinnati, was awarded last week a contract for the construction of a heavy 20-duct conduit system through Cincinnati, leading from the new exchange to the Fremont avenue exchange of the Cincinnati Bell Telephone Company. This has been necessitated by the tremendous increase of the telephone business in Cincinnati during the last year.

THE F. BISSELL COMPANY, of Toledo, Ohio, is distributing its new net price list. This book consists of 446 pages, and is one of the largest and most complete price books ever published by an electrical firm. The F. Bissell Company also wishes to draw the attention of the trade to its type W A desk stand holder which is gotten up in the most approved manner. To those interested a bulletin descriptive of this holder, together with prices, will be mailed upon request.

THE HARVARD ELECTRIC COMPANY of Chicago has moved into larger quarters at 62 W. Van Buren street, owing to the great increase in its business. The company wishes to announce that it is in a better position than ever to fill fuse orders promptly. This company has the largest plant in the world, devoted exclusively to this branch of the telephone art, and also manufactures extensively for other fuse companies. A new catalogue, No. 14, is now ready for delivery, and will be mailed free to anyone mentioning the AMERICAN TELEPHONE JOURNAL.

THE AMERICAN BATTERY COMPANY, of 172 So. Clinton street, Chicago, is furnishing all the storage batteries used in installations of the Automatic Electric Company. Amongst the systems installed using this type of battery is the Hopkinsville, Kentucky, Automatic Exchange, which was recently completed. This company has an exhibit in connection with the Automatic Electric Company. All who visit the fair are invited to call and examine the different types of cells on view.

THE STROMBERG-CARLSON TELEPHONE MFG. CO., of Chicago, Ill., has recently closed contracts with the Citizens Telephone Company, of Sioux Falls, S. D., and also the Edinburg & Gardar Telephone Company, of Edinburg, N. Dakota, for switchboards and equipments. This company reports many inquiries for its party line instruments, which are so arranged that subscribers can call each other without signalling the exchange, or call the operator without ringing any of the subscribers.

THE VOUGHT-BERGER COMPANY will after July 1st be represented in the Dakotas and some of the western Minnesota counties by J. G. Ball, with headquarters at Fargo, North Dakota. Mr. Ball, who has just left the territory in Wisconsin, Northern Illinois and Iowa, where he has been representing the Central Electric Company, Chicago, is an old-time resident of Fargo, where he is highly connected and has done much work in the telephone and electrical field. A fitter selection could not have been made for this fertile section, where there will be much activity in telephony for years to come.

THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY, of Meriden, Conn., has placed upon the market a new type of five-bar telephone which is equipped with its non-interfering ringing device. The inability to ring a subscriber when one or more receivers are off the hook, due to people listening in on the same bridging line, limits the usefulness of the service and forms one of the greatest difficulties in heavily loaded rural lines. This company has overcome this difficulty and has issued a bulletin describing the same, which will be sent on request. The company has also issued its new and enlarged catalogue No. 8.

THE CENTRAL TELEPHONE AND ELECTRIC COMPANY, of St. Louis, which recently bought the Missouri Medical College, at 22nd and Lucas avenue, is having the entire building remodelled with new elevators and Granitoid cellars. All new machinery, such as punch presses, band saws, milling machines, screw cutting lathes, etc., will be installed. The buildings are especially desirable on account of their solidity and also because light is available on all sides, besides a big skylight. The company has brought a man from Berlin at great expense to make all the special tools needed in the manufacture of its apparatus. The company has been so crowded with work that it became imperative to move into larger quarters to handle the constantly increasing volume of business that is coming in.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Savings & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

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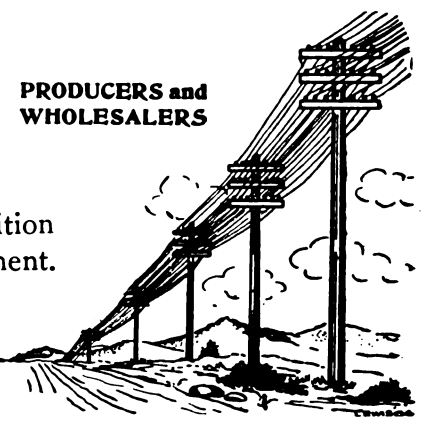

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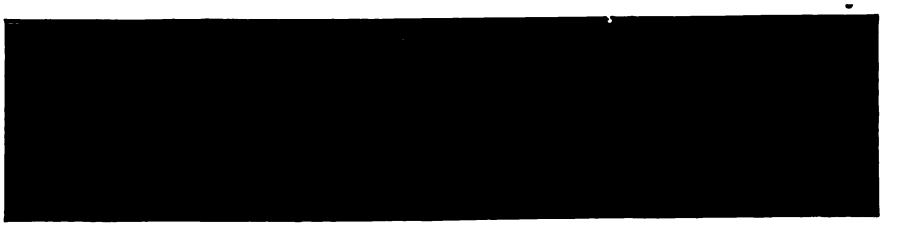

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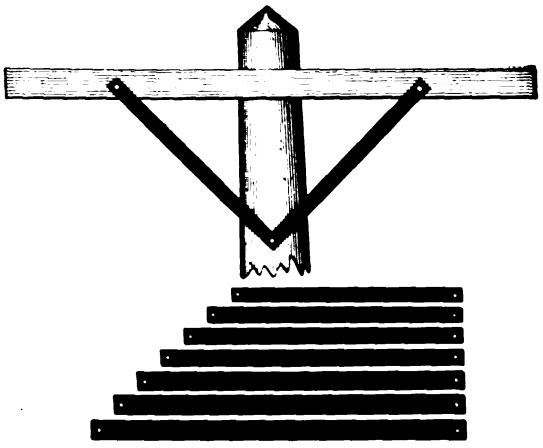

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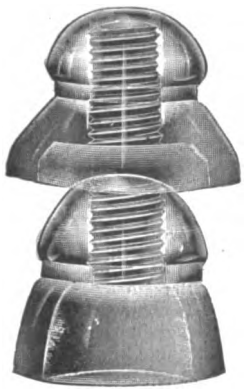

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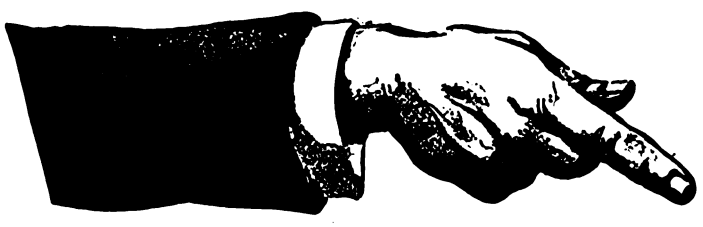

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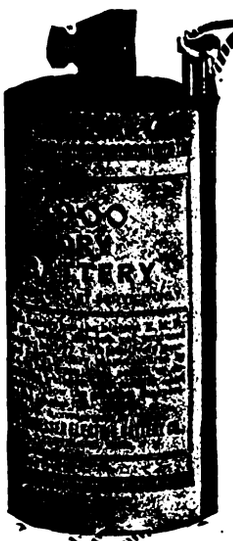

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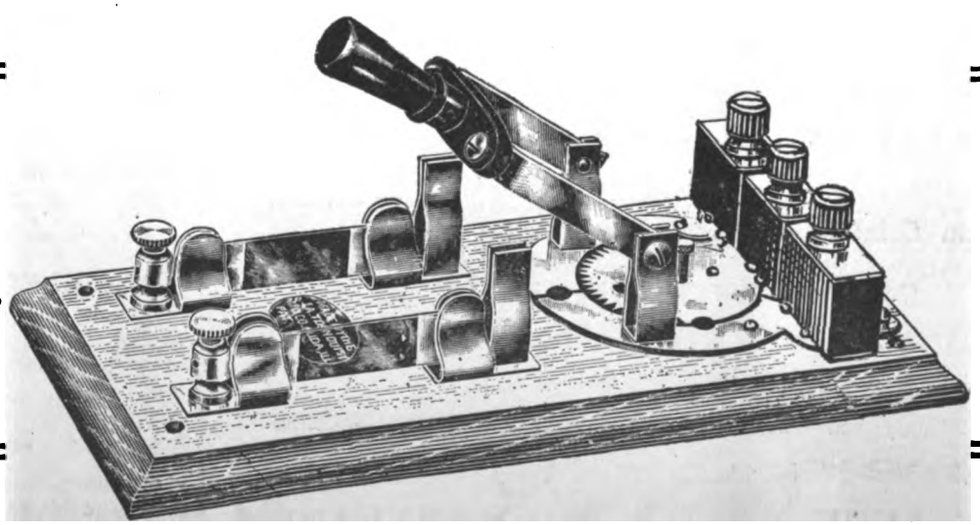

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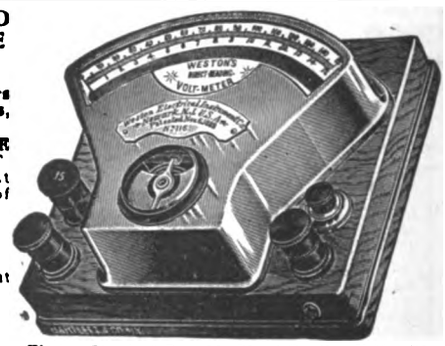

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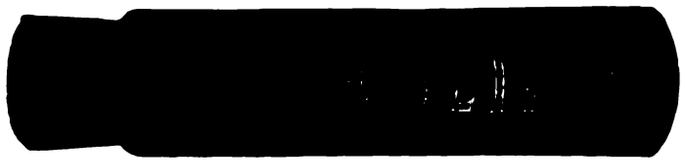

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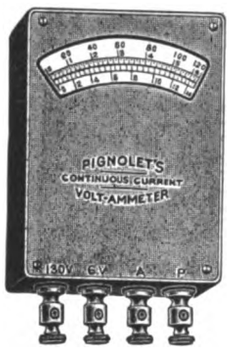

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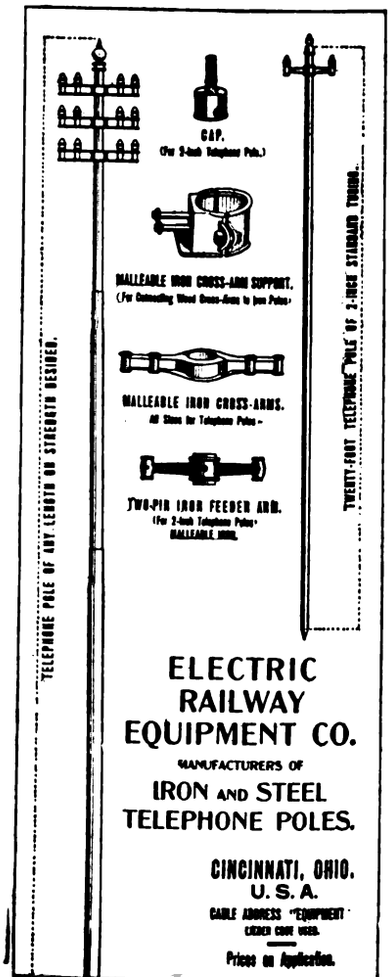

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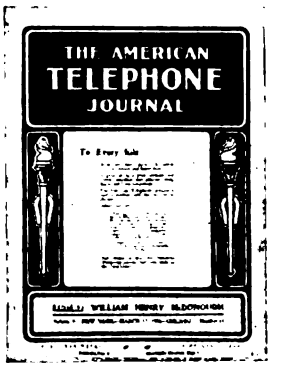

AT the annual meeting of the New York State Independent Telephone Association, the associate membership fee was reduced to $1.00 a year, each associate member paying this amount to be given a year's subscription **FREE** to **THE AMERICAN TELEPHONE JOURNAL.** Associate membership is open to "Any person owning or employed in an official capacity in constructing, or operating an Independent Telephone Exchange, or owning stock in any Independent Telephone Exchange within the State of New York."

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NEW YORK STATE INDEPENDENT TELEPHONE ASSOCIATION
APPLICATION FOR MEMBERSHIP

.....190

The undersigned hereby makes application for membership in the New York State Independent Telephone Association, membership to include subscription to The American Telephone Journal, and encloses herewith the membership fee of One Dollar.

Name..... P. O. Address.....

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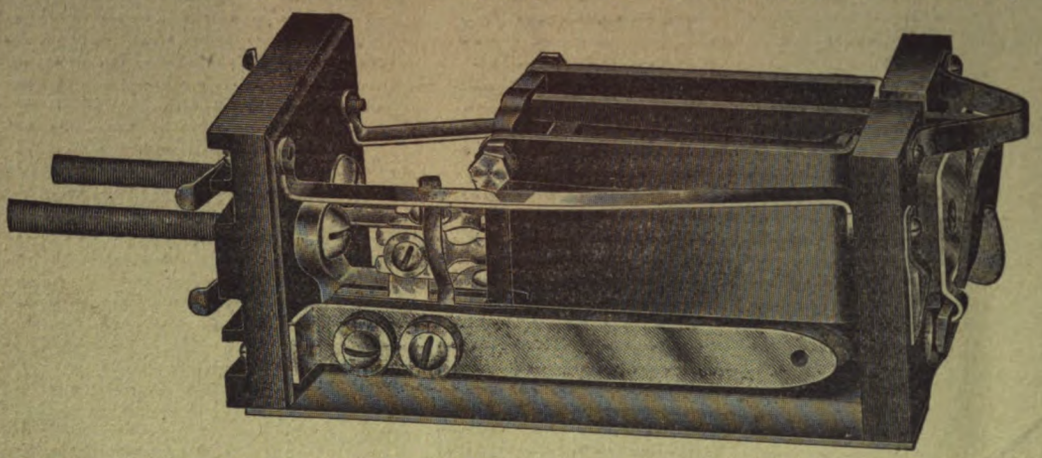

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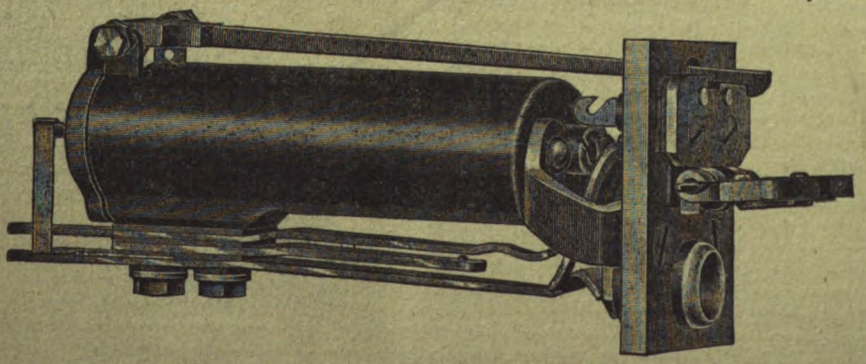

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The above letter is one of many received by the Editor of this paper, which show its standing as the organ of the Independent telephone industry.

Edited by WILLIAM HENRY McDONOUGH

Volume 10 NEW YORK—JULY 23, 1904—CHICAGO Number 4

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Advertisers' Directory, Page 9

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NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

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THE CIRCULAR MIL.....By CLAYTON TRAVERST
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THE INDEPENDENT EXCHANGE AT ELKHART, IND. THE RESTRICTED TELEPHONE LAWS OF CONNECTICUT

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TOLL RATES IN SOUTHERN CALIFORNIA
ELGIN TAXES CHICAGO TELEPHONE COMPANY
SOUTHERN CALIFORNIA NEWS
INTERESTING FACTS FROM SALT LAKE CITY
MEANS TO STOP HUMMING
TAXATION IN WISCONSIN
A PROSPEROUS GEORGIA COMPANY
COMPETITION LEADS TO BANKRUPTCY
THE BELL IN MISSISSIPPI
THE TELEPHONE IN THE COURTS

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THE WEEK'S MESSAGES TRADE NOTES
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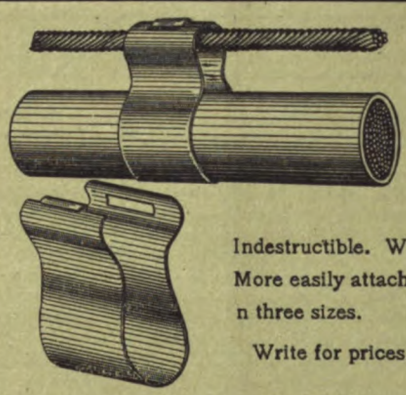

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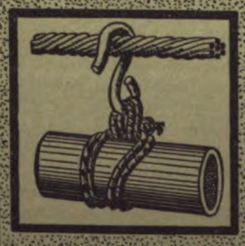

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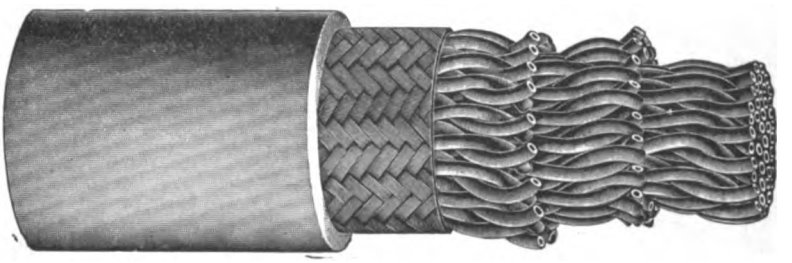

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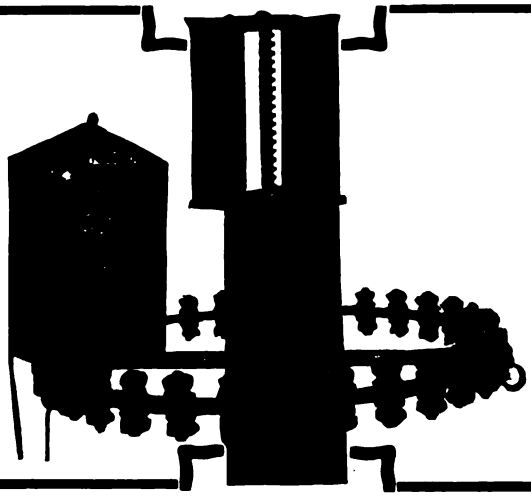

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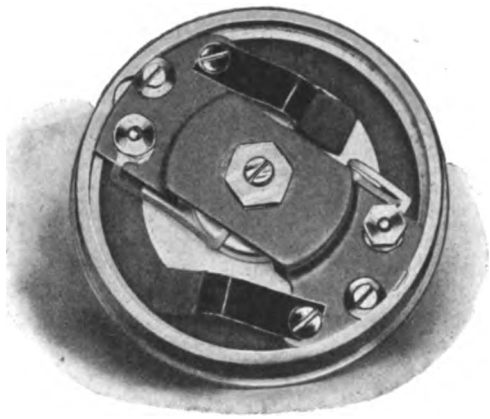
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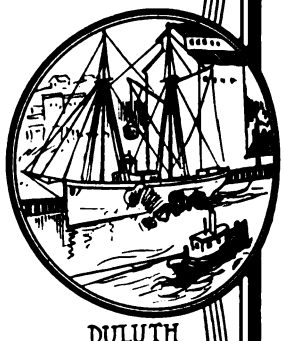
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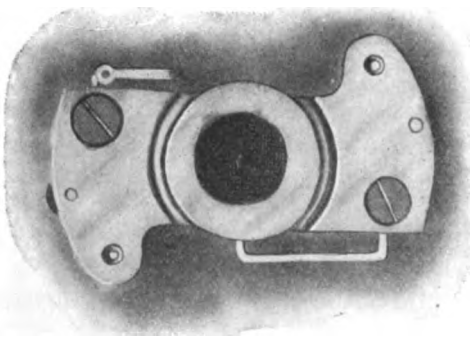
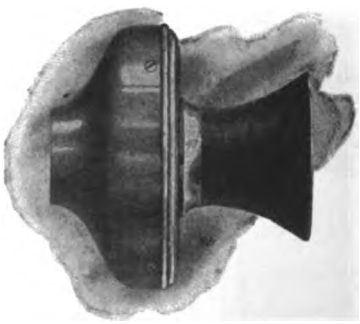
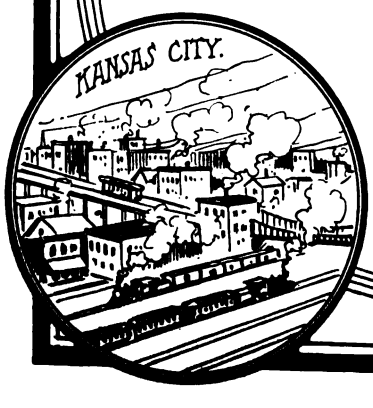


Our latest Bulletin No. 11-B on Generator-Call Telephones will describe fully the above parts and our new developments.

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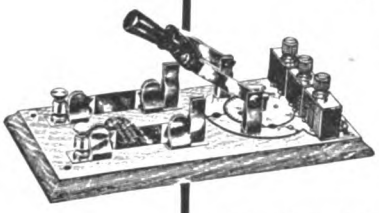

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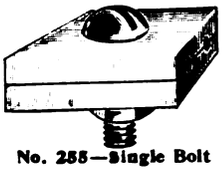

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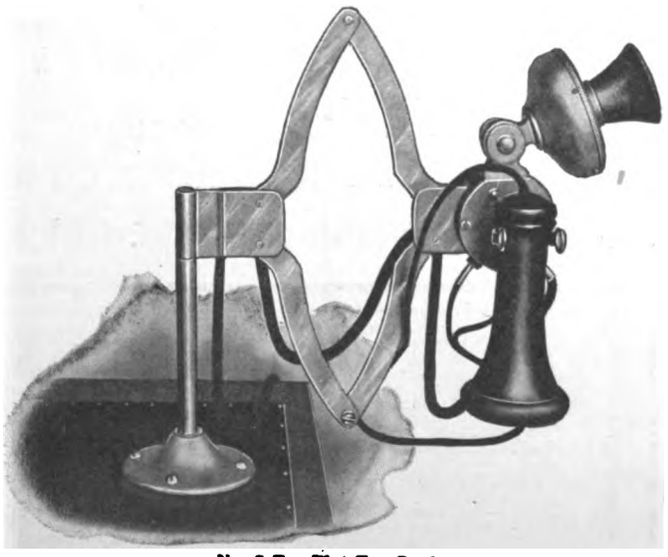

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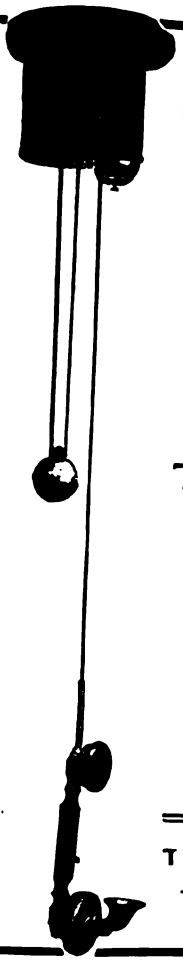

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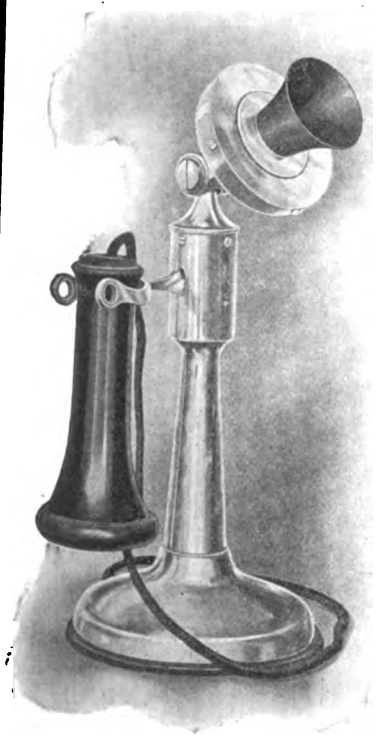

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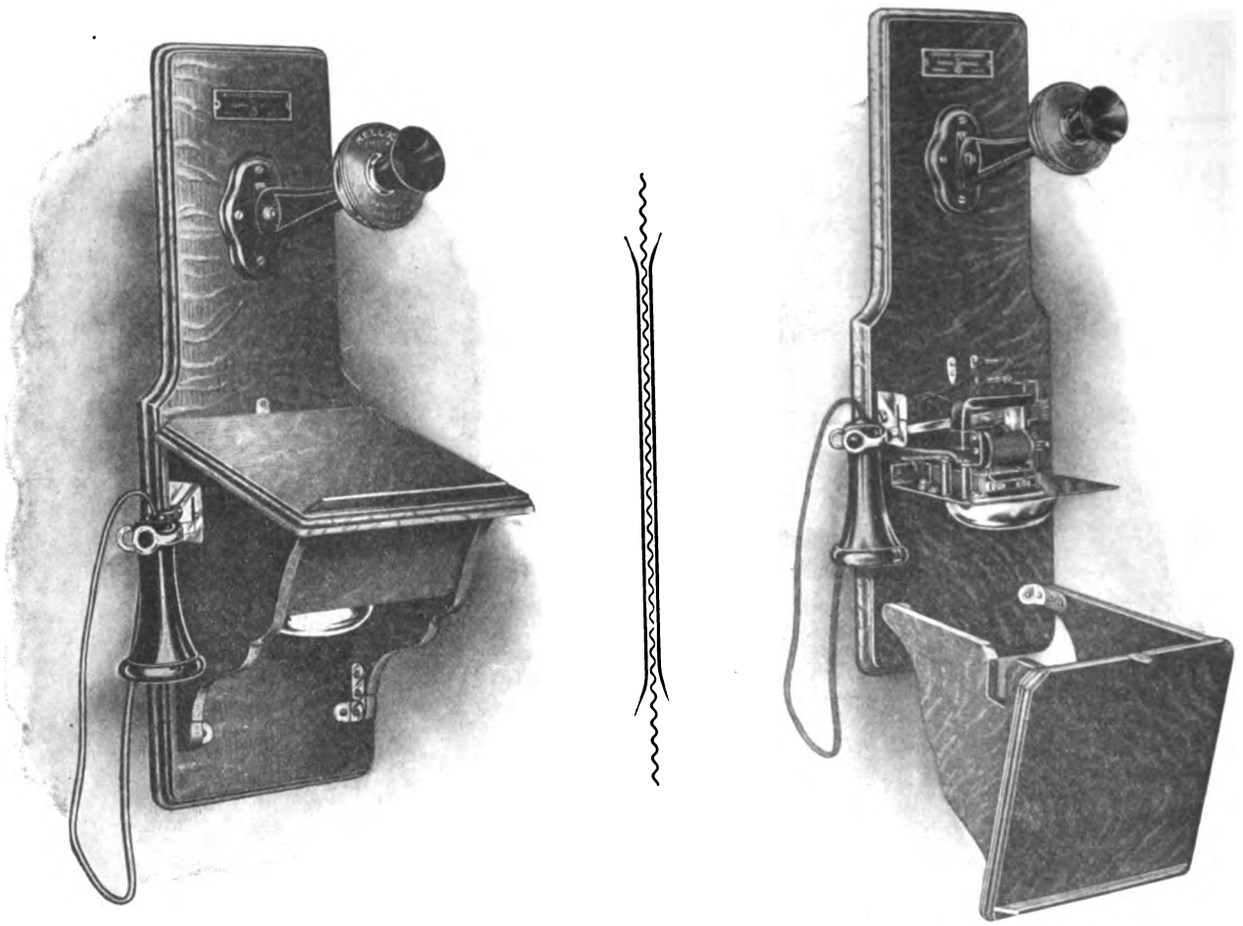

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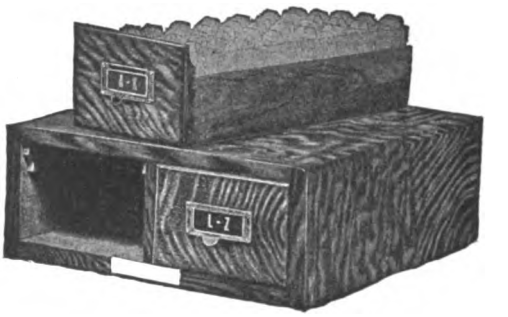

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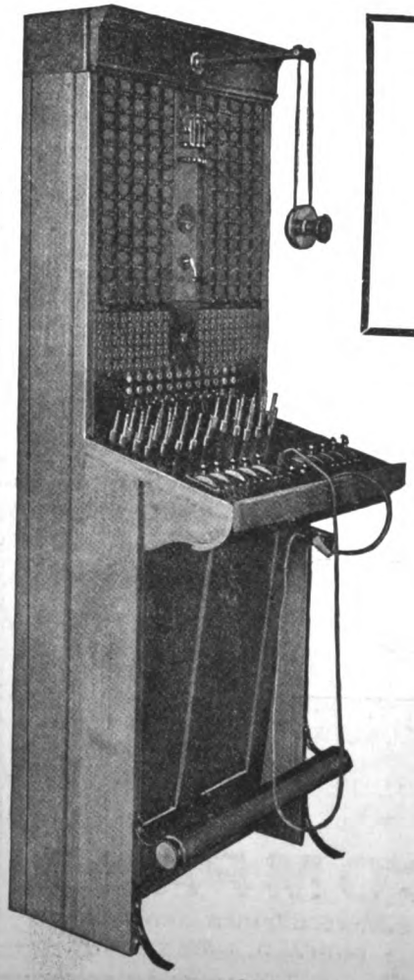

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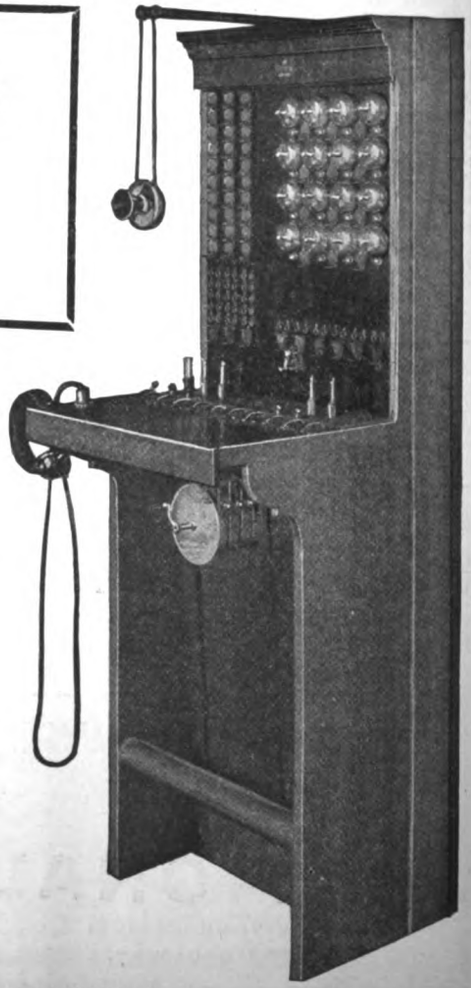

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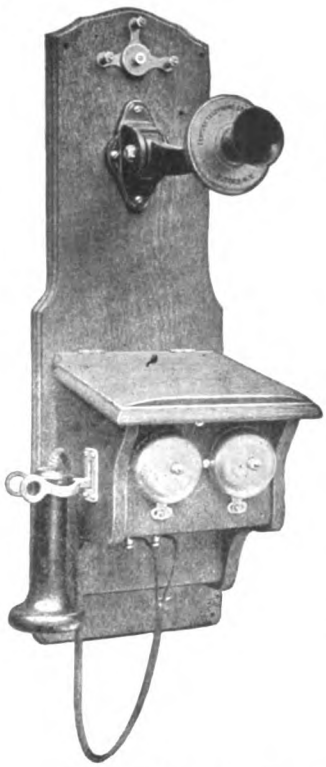

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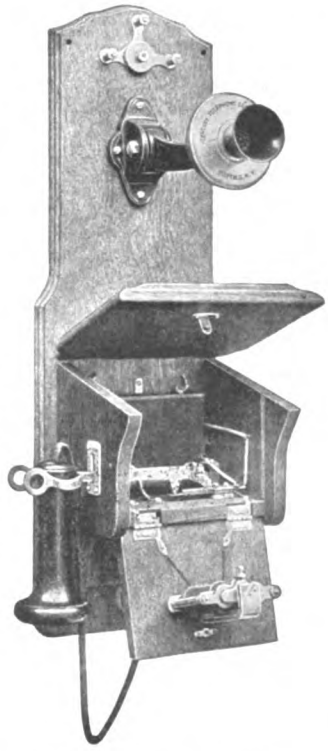

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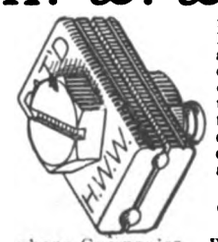
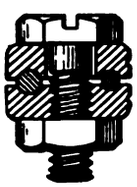


is a standard article of this kind. Each plate has two accurately formed grooves of different depths. By reversal of one plate around the bolt, this test-connector is **applicable to two wires of the same or of different diameters, large or small, toll or exchange, main or branch, terminating or through wires.**



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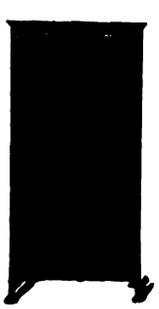

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VOLUME 10 SATURDAY, JULY 23, 1904 NUMBER 4

THE INDEPENDENT EXCHANGE AT ELKHART, IND.

THE development of Independent telephony has been most general in the central States, and of these Indiana has always been foremost in the movement, both in time and in rapidity of construction. New exchanges are springing up as if by magic, and the whole country is rapidly being grid-ironed with telephone lines which are exclusively Independent. The new exchange recently established at Elkhart is an excellent example of the way the Independents have set about their work, both from a business and technical standpoint.

The town of Elkhart is situated a few miles south of the Michigan State line, and almost in the center of the State in an east and west direction. According to the census of 1900, there was a population of 15,184. Elkhart is one of the most progressive towns in the State of Indiana, and is besides an important station on the Lake Shore Railroad, all the trains of which road, even the limited expresses, making a stop. A few miles to the west is South Bend, another thriving town and a little to the southeast is Goshen, the county seat of Elkhart County. As soon as the Independent toll lines began to ramify over the State, it became evident that the closest business and social relation of these three towns demanded a telephone communication with each other and the neighboring villages. The result was the promotion of the Home Telephone Company, of Goshen, and the Home Telephone Company, of Elkhart. The shire towns began to realize the importance of telephone connection with Elkhart and Goshen, which resulted in the forming of the New Paris Mutual Telephone Company, the Clinton Township Telephone Company of Millersburg, the Dunlaps Telephone Company of Dunlap, the Bristol Telephone Company of Bristol, and Middlebury Telephone Company at Middlebury. All of these companies being connected with Elkhart and Goshen and giving their subscribers free service to and from. This makes each town particularly intimate, so intimate, in fact, that this region is virtually a large city, with a radius of twenty miles, and with a total number of subscribers of over three thousand (3,000).

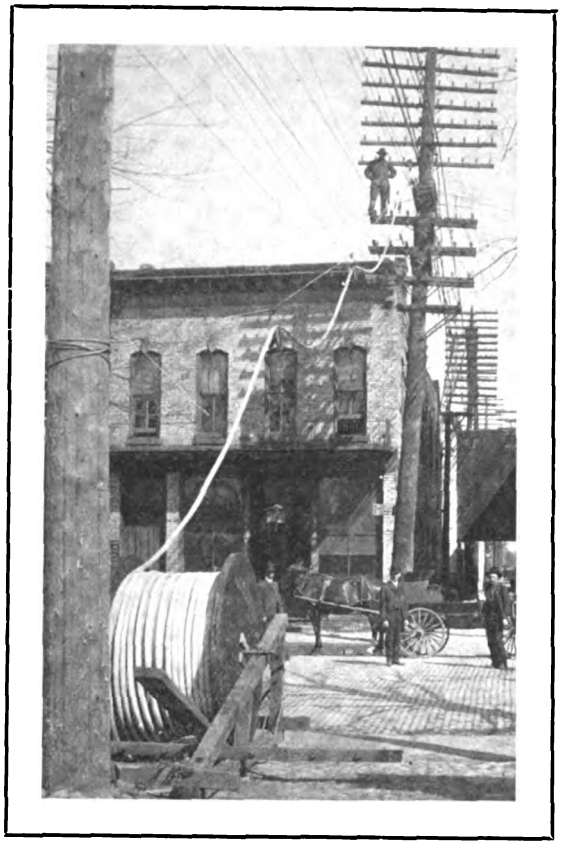

Fig. 2. Line Construction.

In this chain of exchanges, the Elkhart Company became one of the most important. From a small beginning, needing the services of but one operator and a 100-line switchboard, it has recently reconstructed its system and put into operation a switchboard of the latest central energy type. The company has provided a substantial and ornamental brick building, 66 feet by 25 feet, in which space is secured for both the telephone apparatus and the business offices.

The main operating room, shown in Fig. 1, is 24 by 40 feet, the wire chief's and trouble clerk's room is 12 by 18 feet (Fig. 3), ladies' lounging room is 12 by 15 feet, terminal room in which is located the batteries is 12 by 21 feet; also located in this room is the ringing and charging machines. This is on the second floor of the building which is centrally located and is owned by the company.

On the ground floor is a reception room 12 by 18 feet, in which are located long distance pay stations. The cashier's office is divided from this by glass partitions. Immediately back of the cashier's office is the manager's

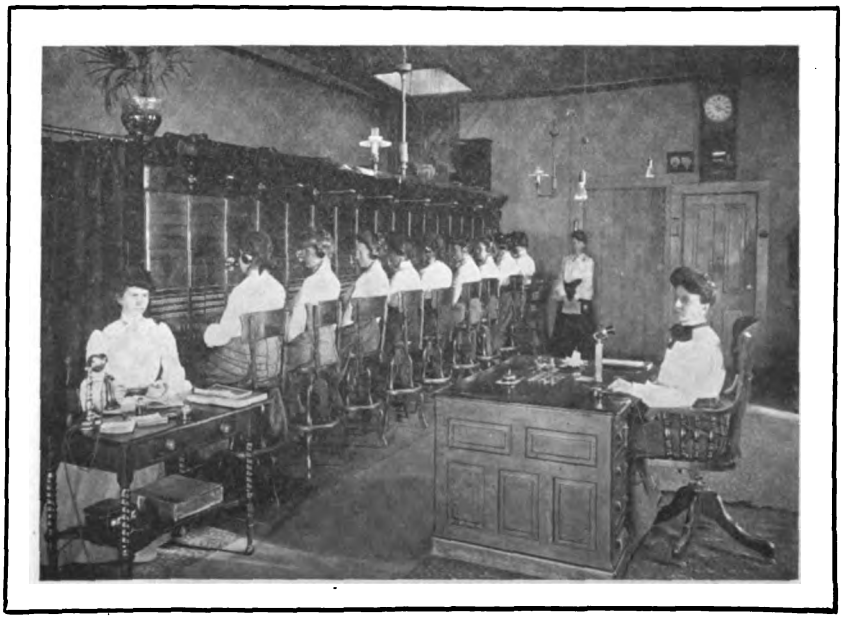

Fig 1. Switchboard of Home Telephone Company, Elkhart, Ind.

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private office. In the rear is the store room, 21 by 25 feet.

The switchboard is a metallic central energy board, made and installed by the Sterling Electric Company, of La Fayette. The capacity installed is 1,200 lines, with 2,400 lines ultimate capacity. A separate toll board also of the Sterling Electric Company's make, is provided; also the chief operator's monitor desk and wire chief's test board. The cross connecting racks and intermediate and protection mounts and power board are of the Sterling Electric type. The charging and ringing machines are made by the Holtzer-Cabot Company.

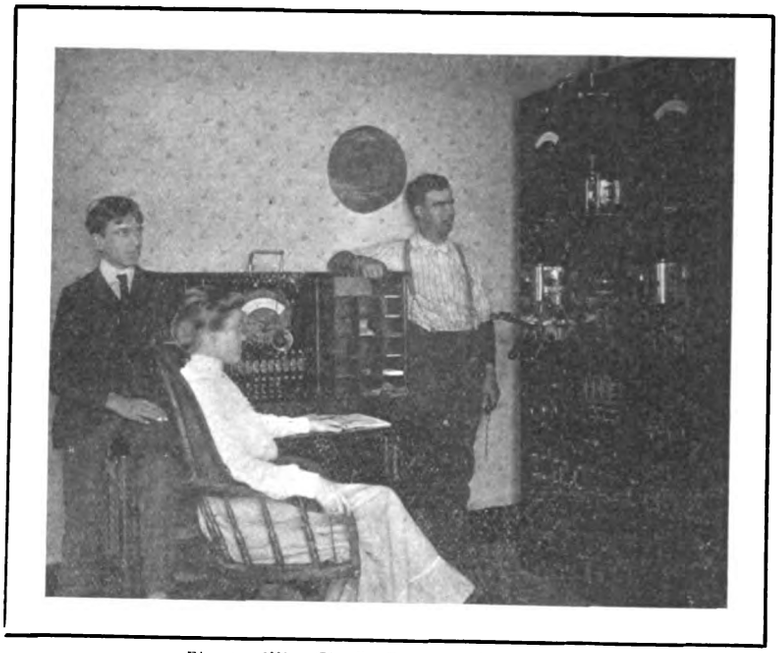
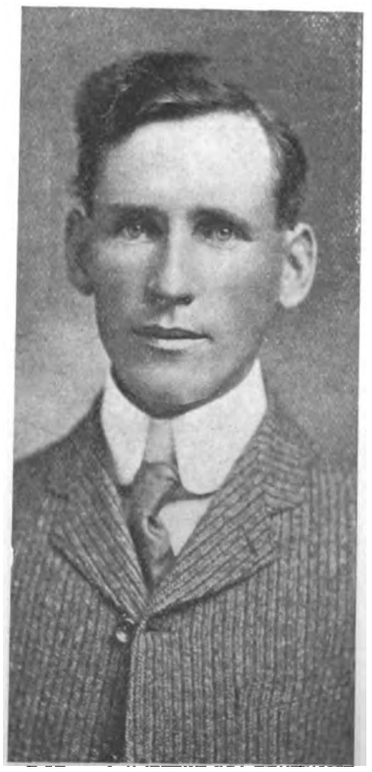


Fig. 3. Wire Chief's Desk and Power Board.

Realizing that in the long run the best construction is the cheapest, the Elkhart Telephone Company decided to use aerial cable as far as possible for the circuits. To free the streets from the objection of overhead lines the distributing poles are as far as practicable placed in the alleys. The poles used are large and substantial and bid fair to offer defiance to many a sleet storm for years to come. Whenever corners occur the poles are heavily double armed. The upper portion of each pole is occupied by the open wire arms that carry the distributing circuits and such open wire lines as are necessary, the cables being carried on substantial iron cross arms directly beneath. Fig. 2 is from a photograph taken during line building and indicates both the type of construction advocated and the methods employed to secure it.

The increase of subscribers at Elkhart and Goshen has been so great that the company has been unable to keep up with the demands for new telephones. It has just completed stringing 14,000 feet of additional cable, which will only relieve the congestion for a short time. As an evidence of what Independent telephony means in Indiana, the following table shows both the relation between the number of Independent and Bell subscribers in the various northern Indiana towns and indicates the field that the Elkhart Telephone Company offers to its patrons:

	Independent.	Bell.
Elkhart Co., Ind.....	3,535	350
St. Joseph Co., Ind.....	3,500	625
Marshall Co., Ind.....	1,000	31
Kosciusko Co., Ind.....	1,500	4
Lagrange Co., Ind.....	900	5
Noble Co., Ind.....	1,100	400
Steuben Co., Ind.....	1,265	50
La Porte Co., Ind.....	1,250	160
Whitley Co., Ind.....	1,500	4
Fulton Co., Ind.....	775	4
Pulaski Co., Ind.....	250	1
Starke Co., Ind.....	300	2
Allen Co., Ind.....	4,000	800
Berrien Co., Mich.....	1,375	8
St. Joseph Co., Mich....	325	33
Total.....	32,575	2,177



J. K. Johnston, Manager
Home Telephone Co., Elkhart, Ind.

The Home Company has more telephones in Elkhart County than the Bell Company has in fifteen counties in northern Indiana. There are in the State of Indiana 107,000 Independent telephones and 40,000 Bell telephones. This growth has developed to such an extent as to make the Bell Company a ridiculous farce in many sections of the country, and the portion of the public, who were originally antagonistic to competing telephone service, because of the service of the two companies, are now outspoken in their compliments to the Independents for the advanced position they have taken in furnishing up-to-date service at reasonable prices. The Home Telephone Company of Elkhart has made it possible for every person whose income is sufficient to permit him to ride on a street car, to afford a telephone. For instance, the Bell Company operated in Elkhart for a period of fifteen to twenty years and had not to exceed at any time, over three hundred (300) subscribers.

At the time the Home Company started in Elkhart the Bell Company had, possibly, one hundred (100) subscribers. The business man was paying from $48.00 to $60.00 per annum, according to the style of service; from $36.00 to $48.00 per annum for residence of which none but the rich could afford. To-day the Home Telephone Company is furnishing service to 1,326 subscribers in Elkhart and over 100 contracts are waiting to be connected. The company is now putting up 1,400 feet of new cable which will accommodate 450 more additional subscribers.

Much of the credit for the successful operation of the Elkhart system is due to the able management of J. K. Johnston, who has worked zealously for the company.

A company representing Elkhart capital has been organized to put in an exchange at Pullman's Corners, Michigan. This exchange will open up with about 100 subscribers located in Adamsville, Edwardsburg, and the southern portion of Cass County. The officers are confident that this exchange will have 200 subscribers. This will enable the present subscribers of the Home Telephone Company to connect with a territory that depends largely on Elkhart as its business center.

Besides the local service, subscribers to the Home Telephone Company can by means of Independent long-distance toll lines reach all points in Indiana and Ohio and parts of Michigan, Illinois and Pennsylvania. In this territory there are upwards of 250,000 Independent telephones, a number far in excess of the Bell. When the long-distance lines which are being projected are completed, the people who subscribe to the Independent systems will be able to reach more points and more people in the United States than the entire Bell systems have subscribers.

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SOME REMARKS ON INSTRUMENT SETTING PROTECTIVE DEVICES.

By B. C. Wilhelm.

THE method employed for building the drop line, from a cable box, differs in no way from that already described for the case where the connection is made with the open wire line. The method of attaching the wire to the line, however, is simpler, and consists merely in fastening to the proper binding posts in the box. The term "simpler" which has just been used, must not be understood as conveying the idea that less care is necessary in the performance of this work. Such is not the case. Just as much care must be exercised in attaching a wire to a binding post as is necessary in making a soldered joint. The idea intended to convey was that the work did not take so long and did not require the use of so many pieces of apparatus.

Some telephone companies equip the cable boxes with a wrench and a screwdriver fastened to opposite ends of a chain. This wrench is made out of a brass casting, one end having a hexagonal hole, which fits over the nut, and the other end being shaped to be used as a handle. The screw

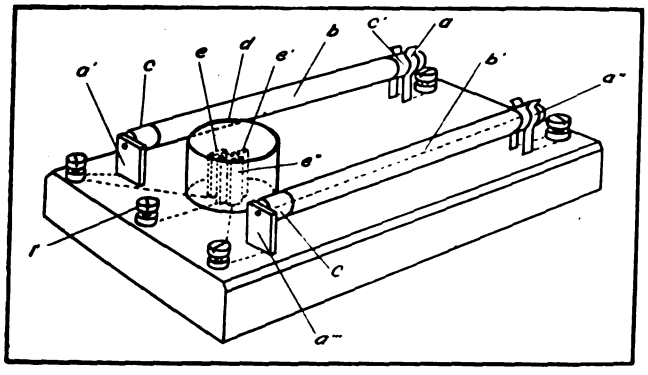

Fig. 5.

driver is made wholly of metal. It is used in tightening the fuses

On all drop lines built from terminals of open wire lines, and aerial cables, and wherever the drop line itself is of sufficient length to render crosses with high tension foreign wires liable, some approved form of protection device must be placed on the line in such a manner as to protect the telephone and the building in which it is placed. This protection device must prevent the entrance into the building of currents resulting from high foreign potential and also from lightning discharges. The currents which result from foreign potential may be either strong or feeble. In the latter case they are called "sneak" currents. The protection device must therefore consist of three parts: That which keeps out strong currents, that which keeps out feeble

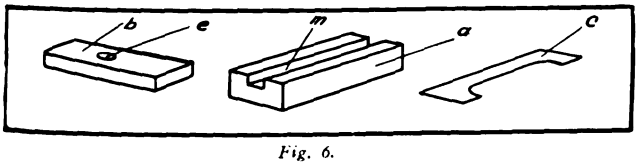

Fig. 6.

currents and that which keeps out high potentials such as those resulting from lightning discharges. In Fig. 5 is shown one form of protection device, which possesses all the essential features. Mounted upon a porcelain base are four brass clips, *a*, *a'*, *a''* and *a'''*, which hold two fiber tubes, *b* and *b'*. These two tubes are equipped at each end with brass bands *c*, *c'*, which make electrical contact with the clips when the tube is held in place. Within each tube is placed at one end a coil of fine wire, one end of which is soldered to the brass ring, *c*; and the other end to a fuse, which runs to the opposite extremity of the tube and is connected to the ring, *c'*. Situated between the two tubes and near one end of the porcelain base is a circular brass cup, *d*, without a bottom. In the center of this cup, and fastened to the porcelain, are three brass strips, *e*, *e'* and *e''*. Of these the two outermost strips are narrower than the center one, which is connected to the binding post, *i'*. Between each one of the outer strips, *e* and *e''*, is placed a protector consisting of two blocks of carbon not shown, which are separated from each other by a strip of mica. A brass cap which screws over the cup is used

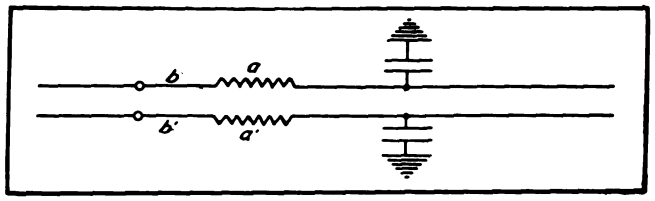

Fig. 7.

to keep out the dust. One of these carbon blocks has a depression bored into the center, into which is placed a small lump of solder.

Under normal conditions the two carbons are separated by an air space equal in thickness to that of the mica. Should, however, the lump of solder melt from some cause or other, it will run out, fill the gap and make good electrical contact between the two. The two carbons and the mica are shown in detail at *a*, *b* and *c*, respectively, in Fig. 6. The lump of solder will be seen at *e*. The carbon, *a*, which rests against the outer spring, is notched, as shown at *m*, so that the spring may fit in and hold the carbon in position. The two outer springs must be bent sufficiently to press the carbon against the middle strip and hold them in place. The three strips, *e*, *e'* and *e''*, Fig. 5, must be placed in a horizontal line, so that when the carbon arresters are placed the space between them will be vertical. This arrangement affords whatever dust may collect a chance to fall out. In placing the mica strips between the carbon blocks, the notch should always face downward, so as not to afford a surface, upon which the dust might collect between. The scheme of wiring the arrester is shown in Fig. 7. The two live wires pass first through the fine coils, *a*, *a'*, and thence through the two fuses, *b* and *b'*,

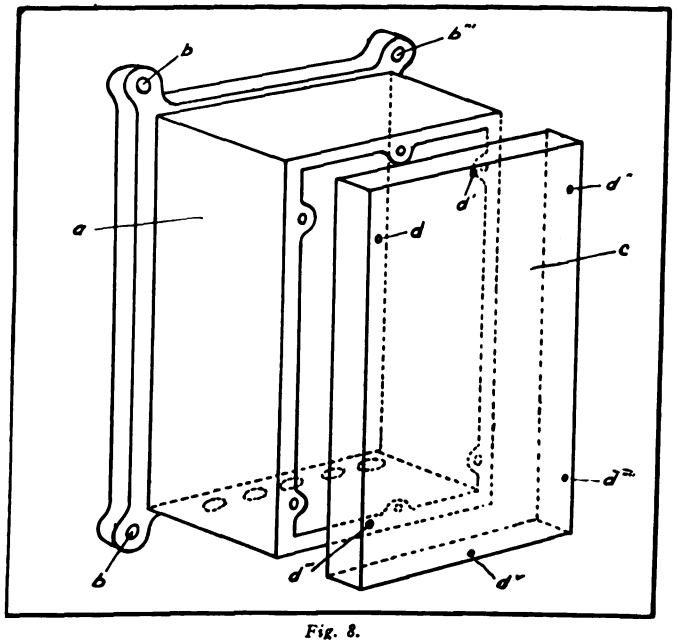

Fig. 8.

the two carbon arresters being bridged to ground, one from one side of the line and the other from the opposite side. These two bridges are open under normal conditions at the two air gaps above referred to.

The method of operation of this piece of apparatus is as fol-

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lows: Should a sneak current enter on the line, the fine wire coils will be heated up sufficiently to burn and open the circuit so as to prevent the current from entering the building. Should a heavy current enter, the fuse will be blown, probably before the

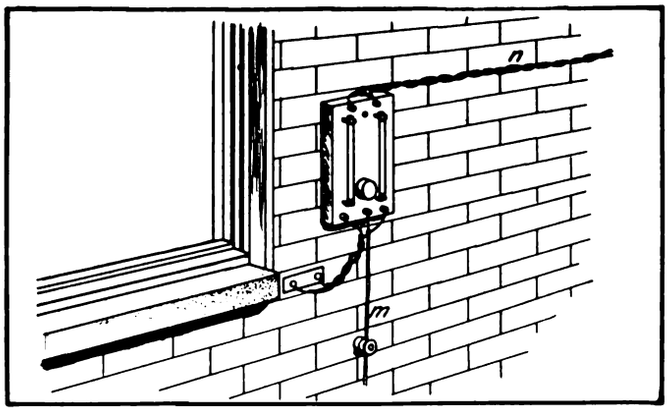

Fig. 9.

fine wire coil has time to melt. This again will open the circuit. If by means of lightning discharge the line be charged to an excessively high potential, it will in attempting to reach the ground, jump across the airgap between the carbon arresters. In doing so it will melt the lump of solder, which in turn will form a solid connection to ground, so that the potential may pass off without doing any damage.

Referring again to Fig. 5, the middle strip, *e'*, is connected to the middle binding post, *i'*, which in turn is wired to ground. The two outside binding posts are for the line wires, and are connected to the clips, *a* and *a'''*.

The protection device already described may be installed either upon the outside or the inside of the building. When it is installed upon the outside it must be incased in a weather proof box, which is sufficiently strong to resist mechanical injury. The box must be so constructed as to be capable of being readily attached to a brick wall, and must be equipped with a water tight cover that can be readily removed to give access to the interior. Such a box is shown in Fig. 8. It consists of a box shaped iron casting, *a*, from the back of which projects four lugs, *b*, *b'*, *b''* and *b'''*, and through holes drilled through the center of each one screws are driven into the surface, upon which it is to be mounted. The cover, *c*, also of cast iron, is held in place with screws, *d*, *d'*, *d''*, *d'''*, etc., and is made to fit tight by means of a rubber gasket. Through the bottom of the box five holes are drilled. Two of these are for the drop wire, two for the leading-in wire and the remaining one for the ground wire. These holes are bushed with porcelain tubes.

In Fig. 9 will be seen a protector mounted inside of the building. The drop wire is seen entering to the right of the window, the house wire coming off at *n* and the ground wire at *m*.

In attaching wire to the binding posts of the arrester, the same care must be exercised as has already been mentioned in connection with the cable box binding posts.

THE RESTRICTED TELEPHONE LAWS OF CONNECTICUT.

TELEPHONE monopoly is strongly intrenched in the statutes of Connecticut and the extension of the lines of the Independent companies already established in the State, or the organization of new ones, is rendered extremely difficult by legislative barriers. By the laws of 1899 every telephone company in existence on May 3rd of that year is limited in its operation to towns in which it was doing business on that day, except upon a finding that public convenience and necessity demand an extension of its field. In the same way, no new company can establish its system and construct its plant without such a finding; the finding to be made by the Superior Court of Connecticut or a judge thereof, in due form. Notice must be given of the application to the selectmen of any town, to the warden and burgesses of any borough, of the day of hearing; or to the mayor of any city within which the extension or construction is sought to be made. Ordinarily, this alone would be impediment enough in the way of the erection of a telephone line, because the planting of poles is, under any circumstances, objectionable to adjacent owners of property, and the opportunity of objecting to the municipal authorities would be readily taken advantage of by the property owners.

The purpose of this act is most clearly seen in the requirement that notice shall be given at least twelve days before the date of hearing to any other telephone company, association, or corporation, that may be affected by the construction or extension of the new system. Under these provisions a competing telephone company is permitted to come into court and object to the construction nor extension of the new line on the ground that the already established company is giving satisfactory service, supplying all the telephones required, at reasonable rates. This places the establishment of Independent companies in Connecticut in the power of the Southern New England Telephone Company, the local branch of the Bell monopoly. The superior court or judge is empowered to hear the parties and determine whether, upon consideration of the facts, circumstances, and conditions of the business, public convenience and necessity require the proposed action. The decision of the court or judge is final and conclusive, subject to appeal to the Supreme Court on questions of law only. The act applies only to companies organized for the transaction of a telephone exchange business, and it has been contended that companies which used an "interior" system, in which no central operator is employed, were not doing a "telephone exchange business" and were, therefore, not amenable to the law. Although the question has not been passed upon by the Supreme Court the contention seems valid, since the law should be strictly construed.

The statute would also not apply to an individual engaged in the business. Haynes vs. Crosby (Me.), 47 A., 137. This was the holding under the restrictive telephone law of Maine, which provided that "no corporation organized hereunder shall have authority, without a special act of the legislature, to construct its line along the route or routes used, or authorized to be used, by any other telegraph or telephone company, person or firm, or between different points connected or authorized to be connected by the lines of any such company, person, or firm, unless it shall first obtain the consent of such other company, person or firm." The court said of that law what is true of the Connecticut law, that "this statute is so prohibitive of competition, even if wholesome, that we are not inclined to an extension of its operation beyond its plain and specific language. It prohibits corporations organized under the act from establishing a telegraph or telephone line in competition with an existing or authorized line, without the consent of such existing company, but it does not prohibit an individual, not incorporated, from establishing and operating such a line."

The most objectionable feature of the infamous Connecticut laws is the difficulty of proving the public convenience and necessity required by the statute. The officers of the Bell Company will always be ready to swear that they can furnish all the telephones required by the public; and they can always prove that their profits are reasonable and not exorbitant, the latter fact being so exclusively within the knowledge of the officers that it would be almost impossible to obtain contradictory evidence. The law was very evidently draughted by the Bell Com-

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pany in its own interest, and no matter how strictly it is construed, it cannot fail to operate to the advantage of its promoter. The principal sections of the law follow:

SECTION 3918—RIGHTS OF COMPANIES IN OPERATION MAY 3, 1899, LIMITED.

Every company, association, or corporation heretofore organized under a special charter, or under any former joint stock law of this State, for the transaction of a telephone exchange business, in whole or in part, is hereby limited to its operation, so far as pertains to the telephone exchange business, to the limit of the town or towns in which the plant and structures of such company, association or corporation actually existed, and were in operation, in whole or in part, on the third day of May, 1899, except upon a finding that public convenience and necessity require an extension of such limits as hereinafter provided.

SECTION 3919—HOW COMPANY MAY BE AUTHORIZED TO EXTEND OPERATIONS.

Every such company, association or corporation whose plant was so in existence and in operation on the third day of May, 1899, desiring to extend its telephone exchange business to another town or towns, and any other such company, association or corporation heretofore existing, or hereafter organized under the laws of this State to do a telephone exchange business, is hereby prohibited from taking any steps under the general statutes of this State, for the location of its poles or conduits, and from commencing to construct its said extension or its said plant until it shall have applied to the Superior Court or to a judge thereof, and shall have attained from such court or judge, in the manner hereinafter provided, a finding that public convenience and necessity require the carrying on of such telephone exchange business by such company, association or corporation, within the territorial limits, or some portion thereof, stated in its application.

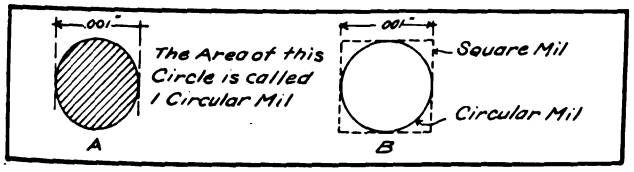
SECTION 3920—COURT OR JUDGE SHALL DETERMINE WHERE TELEPHONE SYSTEM IS NECESSARY.

Every such company, association or corporation intending to construct or extend a telephone system for doing a telephone exchange business shall make application to the Superior Court or to a judge thereof for a finding that public convenience and necessity require the construction or extension of such telephone system by such company, association or corporation, and any such application shall state the territorial limits in which it is intended in good faith to extend or construct such telephone system; and such court or judge shall thereupon fix a time and place to hear such application, and shall cause notice to be served at least twelve days before the date of the hearing upon any other telephone company, association or corporation organized under special or general law, that may be affected by such construction or extension, and upon the selectmen of any town, the warden and burgesses of any boroughs, or the mayor of any city, within whose limits such extension or construction may be made. Such court or judge may hear the parties and determine whether, upon consideration of the facts, circumstances and conditions of the business, public convenience and necessity require the extension as heretofore defined, or the construction of such telephone system by such company, association or corporation, and the decision of such court or judge, subject, however, to review on appeal to the Supreme Court of Errors on question of law arising in the trial of said case, shall be final and conclusive upon the parties. Such court or judge, upon such hearing, may make a finding that public convenience and necessity require the extension or construction of such a telephone system by the applicant in whole or a part of the territory named in the application.

THE "CIRCULAR MIL," ITS DERIVATION AND CALCULATION.

By Clayton Traverst.

It is often more convenient to specify the sectional area of an electrical conductor than to give its wire gauge number, and where the conductor is larger than .46 inch (No. 0000 A. W. G) it is imperative, as 0000 is the largest gauge number in general use. The *circular mil* is a unit of measure developed by electricians to avoid the awkward calculation necessary to get actual area in square inches. Referring to Fig. *a*, if a circle could



be drawn having a diameter of one one thousandth of an inch, its area would be one *circular mil*. (The illustration is enlarged many times.) That is, electricians have agreed to name such an area a *circular mil*. The usual abbreviation is *C. M.*

To find the area in circular mils of any conductor of circular cross section, square its diameter expressed in thousandths of an inch. (The reason for this will be explained later.) *Example*: Find the area in *C. M's.* of a No. 0000 copper wire. The diameter of 0000 is forty-six-hundredths of an inch (.46"). Forty-six-hundredths expressed in thousandths is four hundred and sixty thousandths (.460"). Therefore

$$460'' \times 460'' = 211{,}600 \text{ } C.\ M's.$$

As an illustration to show the large amount of work that is avoided by the use of the circular mil, we will follow the regular method used in calculating the area of the wire in square inches. The area of a circle equals *the diameter squared times .7854*, or expressed algebraically

$$A = d^2.7854$$

Therefore substituting values from the previous example

$$A = .46 \times .46 \times .7854$$
$$.46 \times .46 = .2116$$
$$.2116 \times .7854 = .1663+$$

Where the *C. M.* method is used the use of the constant .7854 is avoided.

Now to explain the *C. M.* method. A rule of arithmetic tells us that the areas of circles are proportional to the squares of their diameters. That is, if one circle has twice the diameter of a second, it will have four times the area because $2^2=4$. Expressed in the form of a proportion, this statement reads:

$$\frac{A_1}{A_2} = \frac{d_1^2}{d_2^2}$$

Therefore, if a circle one mil (1 m) in diameter has an area of one *circular mil*, (1 C. M.), a circle four hundred and sixty mils in diameter. (460 M) will have, four hundred and sixty squared, *circular mils* area (460^2=C. M. area), or substituting in equation (1).

$$\frac{1}{A_2} = \frac{1^2}{460^2}$$

Sometimes it is desirable to express the area of a rectangular or square cross section in *circular mils* or *vice versa*. In such an instance it is best to first obtain the area in *square mils*. A square mil is an area equivalent to that of a square, having sides one one thousandth of an inch long. A square *mil* is shown enlarged in Fig. *B*. To do this, *multiply the value of the base of the rectangle expressed in thousandths by the value of the altitude*

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likewise expressed. The figure shows relatively the sizes of a *circular mil* and of a *square mil.* Obviously the *circular mil* is the smaller area. The area of the *square mil* in square inches is

.001"×.001"=.000,0001 square in.

The area of the *circular mil* in square inches is

.001"×.001"×.7854=.000,007,854 square in.

Therefore the area of the *square mil* is to that of the *circular mil* as 1 is to .7854 or

$$\frac{\text{A S M.}}{\text{A.C.M.}} = \frac{1}{.7854}$$

Therefore, to get square mils multiply circular mils by .7854.

To get circular mils divide square mils by .7854.

Example: What is the area in *C. M's.* of an aluminum bar 1 inch by 2 inches in section?

1 inch=1,000 mils.

2 inches=2,000 mils.

1,000×2,000=2,000,000 sq. mils.

$$\frac{2,000,000}{.7854} = 254,646,000 + C.\ M.$$

A=.46×.46×.785

From the foregoing it is evident that in calculating the use of the mil is to be preferred to the usual methods.

LONG DISTANCE TOLL-ACCOUNTING.

ARTICLE II.

By C. L. Norton. *General Toll Accountant, United States Telephone Co., of Ohio.*

PREPARATORY to the work of handling the reports after they are received by the general toll accountant, it may be well to emphasize the need of adapting a uniform practice of classifying all messages into four sources, namely, "tolls sent paid," "tolls sent collect," "tolls received paid" and "tolls received collect." A concise explanation appears on a circular letter of instructions. An enormous amount of confusion is the result of trying to locate "check errors," if some exchanges are permitted to report "reversed messages," either as "tolls sent paid" or "tolls received paid."

All toll reports should be forwarded before the 10th day of each month, but in cases where a local exchange company has several toll stations to report, it is impossible to receive this particular report until the 25th of the month. As soon as the report is received the amount of gross revenue, which consists of "tolls send paid" and "tolls received collect," is entered on to a daily statement, together with the amount of business transacted during the previous month. This information makes it possible for the management to know each day the amount of decrease or increase in revenue, together with the percentage of such gain or loss. The reports are then verified to detect errors in addition, or computation.

After all reports are received and verified, the individual items of debits and credits are entered on the toll abstract ledger, Fig. 6, which affords a summary of the tolls transacted for the entire system. A certified, classified statement of such totals is then prepared for the auditor.

Where a local company has toll lines of its own which are used for connecting toll stations with the lines of the United States Telephone Company, extra territorial line business or mileage is computed, which is the division of interchanged tolls passing jointly over the lines of the United States Telephone Company and the local company.

All toll business that is subject to a mileage pro rata must be reported to this company, giving full information as to the number of messages, together with the amount of the originating and terminating tolls.

Before a mileage credit is computed, the commission paid the station originating its tolls, together with the commission paid the station originating the tolls terminating at a local company, must be deducted.

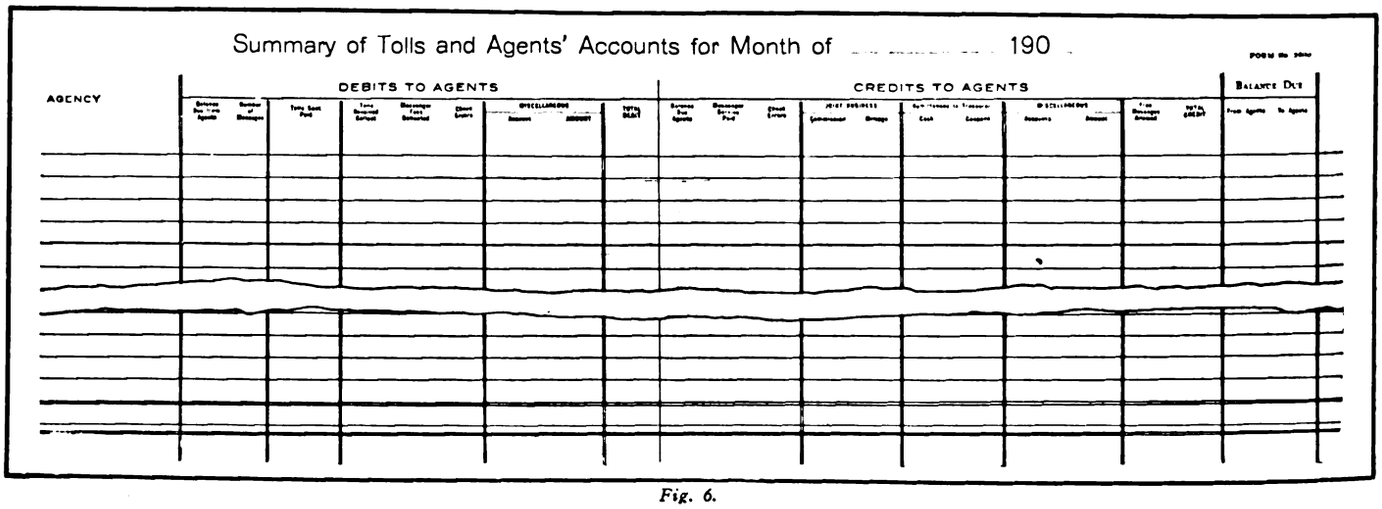
The net amount is then divided proportionately, to the distance that each company's haul bears to the total haul. All measurements to be made direct air line and not pole line.

On originating business the haul that is credited to a local company is the distance a message is hauled over the local line from the point of origin to the nearest exchange having direct connection with our circuits; this place is known as a switching, or transferring point, our haul on the same message being based from the switching point to the point of destination.

On terminating business the local company is credited with the distance from the point of transfer to the point of destination, our distance being computed from the originating point to the point of transfer.

For example, let the United States Telephone Company be known as the first party and a local company as the second party. Let "A" represent a substation of the second party and "B" an exchange connected directly with the lines of the first party, but belonging to the second party, and "C" a point on the lines of the first party belonging to some other local company.

The distance from "A" to "B" over the lines of the second party is 10 miles. The distance from "B" to "C" over the first party's line is 30 miles. The number of messages originating at "A" for "C" is 80; at the rate of 10c. amounts to $8. The number of messages terminating at "A" from "C" is 80; rate, 10c.; amount, $8.


Summary of Tolls and Agents' Accounts for Month of ..... 190 .

AGENCY

DEBITS TO AGENTS

CREDITS TO AGENTS

BALANCE DUE

Fig. 6.

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Originating tolls	$ 8.00
Terminating tolls	8.00
Total	16.00
Less 25 per cent. com. paid local companies for originating commission	4.00
Net amount to be divided	$12.00

Business Interchanged.	No of messages sent and received.	Local Haul, Miles.	U. S. Haul, Miles.
"A" to "C" & "C" to "A"	160	1600	4800

Total number of miles arrived at by multiplying the number of messages transacted by each station by the air line distance that each station is entitled to.

As the total haul of both companies is 6.400 miles, the local company's fractional proportion is $\frac{1600}{6400}$. By multiplying $12 by the fraction, a mileage credit is obtained of $3.

After the mileage credit is obtained, three settlements are made. First, business transacted at the exchange connected directly on our circuits. Second; business transacted at a toll station that passes over local lines before connecting with our circuits. Third; a recapitulation of settlements No. 1 and No. 2, or a general settlement of the month's toll business. This settlement is mailed back to the local company for their verification, and after it is checked, a remittance is forwarded back to this company covering the debit balance as submitted.

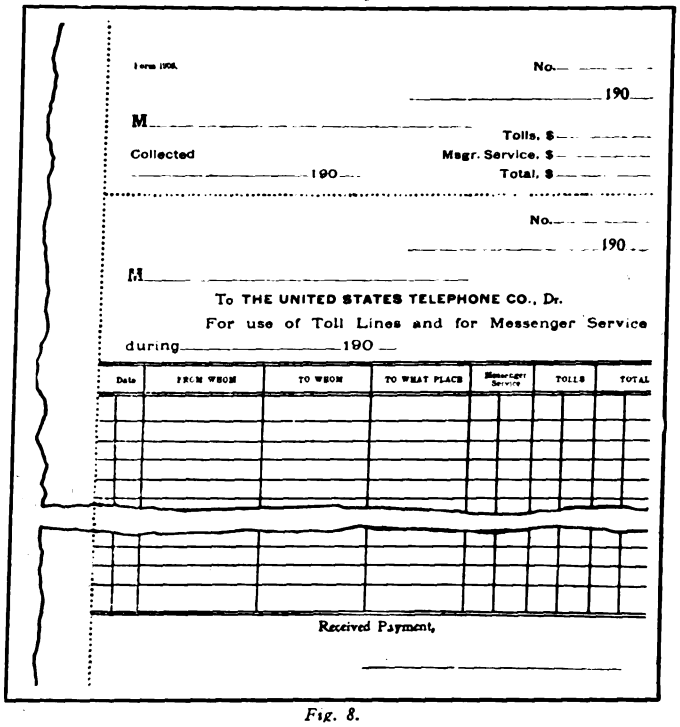
The next procedure is to cross-check all reports for the omission of tolls, after this work is performed. "Error sheets," Fig. 7, are compiled and sent to the local company; inasmuch as some little time is required for investigation by the local company of such errors, aggravating delays are experienced in some instances. To hasten the return of an "error sheet," with explanations and remittances, postal cards, or other means of communication are necessary.

To further facilitate the local company's work in locating omissions, requests are frequently received for a copy of a ticket, or tickets for business transacted with a certain station reported as in error, postal cards are then forwarded requesting such information as required.

Immediately after the reports are cross-checked they are then verified as to the rates used by the local company. If incorrect rates are used, a detailed report of the correct rate and the rate used by them in error is sent to them, emphasizing the importance of using the rates as issued by the general office.

Reference is made especially, to the record of "mileage," which must be kept up each month in order. A book of irregularities is essential for the Checking Department. No period of checking passes that does not add information to this valuable record.

Line rentals; This revenue consists of "terminal loop service," "leased telegraph service," and, "special toll service," and the accounts are handled separately from the toll reports; after the management has made a contract for any service, an abstract of the contract is furnished the General Toll Accountant, who immediately places the copy into a binder after properly indexing the record.


Form 1908.

No.

190

M

Tolls, $

Collected

Msgr. Service, $

190

Total, $

No.

190

M

To THE UNITED STATES TELEPHONE CO., Dr.

For use of Toll Lines and for Messenger Service

during 190

Date	FROM WHOM	TO WHOM	TO WHAT PLACE	Messenger Service	TOLLS	TOTAL

Received Payment,

Fig. 8.

THE UNITED STATES TELEPHONE CO., CLEVELAND, OHIO

DEPARTMENT OF TOLL ACCOUNTS—ERROR SHEET

Office at .....

	AS YOU REPORT				AS OTHER STATIONS REPORT				
STATION	Tolls Sent Paid	Tolls Received Collect	Messenger Fees Collected	Messenger Fees Credited	Tolls Received Paid	Tolls Sent Collect	Messenger Fees Paid	Messenger Fees Collected	DEBIT

(This Space is Ruled for 16 Lines)

NOTE.—Please note corrections on your monthly report for ..... Please check at once, furnishing under the head of "remarks" any explanation you have regarding the differences as shown. Kindly debit the amount of all check errors on the first report sent to this office after this sheet is received by you. Please return error sheet with the report.

Yours very truly,

THE UNITED STATES TELEPHONE CO.

.....

General Toll Accountant.

REMARKS

Fig. 7.

It is found that better results are obtained by making invoices at a certain period each month; this requires a new contract to be billed from the date of such issuance to the first of the month next following. In this way all invoices are made the first day of each month. The form used is shown in Fig. 8.

Before the invoices are mailed, a transcription is made of the name and amount, which is kept before the person who has charge of the accounts, and by a system of "following up" letters, the accounts are paid in a most satisfactory manner. At the end of each month the Auditor is furnished a certified trial balance and distribution, of all accounts of this description.

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TELEPHONE LAWS IN CONNECTICUT.

INDEPENDENT telephone companies and associations everywhere have been vitally interested in the gallant fight which the Farmington Valley Telephone Company, of New Britain, Conn., has been waging against the telephone laws of that State. THE AMERICAN TELEPHONE JOURNAL has followed this litigation, step by step, and has come to the reluctant conclusion that there is no chance for a natural development of Independent telephony in Connecticut as long as the present telephone laws are on the statute books.

Connecticut seems rather inclined toward extremes in legislation. In the early days of the State there were enacted by the Legislature a series of so-called blue laws by which the State government undertook to legislate the most violent and frosty kind of morals into the people. In these telephone laws the Legislature has gone to the other extreme, and, under the plea of protecting the people from speculation in franchises on the part of ephemeral corporations, has actually turned over the State to the grasp of a merciless monopoly. The telephone laws can well be called the black laws of Connecticut.

In passing the infamous laws of 1899 the Connecticut Legislature practically served notice on the telephone public that no other than a Bell company need apply. If this interpretation had been stated in so many words it would not have been more clear what was the meaning and purpose of the laws. One section limits every telephone company organized prior to May 3, 1899, for the transaction of a telephone exchange business, to the limits of the town or towns in which such exchanges actually existed on that date, "except upon a finding that public convenience and necessity require an extension of such limits as hereinafter provided."

The next section is broader. It pertains to all telephone companies, whether they were in existence prior to this date or thereafter organized, and prohibits said companies from commencing the building or extension of their plants without obtaining from the Superior Court a finding that public convenience and necessity require the carrying on of said business. A third provision clinches these nails on the other side.

These are the laws that the Farmington Company went up against when it undertook to extend its lines, and it is interesting to note that the company successfully "called the bluff" and applied to the Superior Court for a finding of "public necessity and convenience."

The failure of the opposition to object to this finding, in this particular case, does not alter the manifest purpose of these laws, and does not make them any the less an outrage on a long suffering public. When a wealthy monopoly stands ready with money and affidavits unlimited to prevent a competitor from getting a foothold in the field, it would by no means be an easy matter to prove an actual necessity for the establishment of a business. The public may be confident that a healthful competition would reduce the price of telephone service. It may be confident that the service is not all that it should be. The fact remains that the community could manage to exist without a competing line.

A corporation like the Bell monopoly, which in this particular case takes the form of the Southern New England Telephone Company, does not easily let go its hold on a community. It is strongly entrenched. The very fact that the Legislature was willing to pass such unjust laws is in itself evidence of the Bell power in politics. The Bell influence is widespread. Independents can expect no relief from the Legislature. The same power which secured the passage of these black telephone laws would operate to prevent their repeal.

On the other hand there is little hope of relief from the Superior Court. All judges are not corrupt; but the advantage of such a wealthy corporation is great. Its indirect influence on the courts cannot be estimated, and its direct influence is sometimes an insurmountable obstacle.

In this dilemma, on one or the other horn of which, Independent telephony is in imminent danger of being impaled, there is one loop-hole of sure escape. The telephone laws of Connecticut are special legislation of the worst kind and are in reality unconstitutional. They should be declared unconstitutional by the highest court in the State.

It will take money to fight such a case up through to the Supreme Court. A comparatively small company like the Farmington cannot be expected to go into this expensive litigation, important as it is. Independent companies outside the State can hardly be expected to do so. They have troubles of their own. It seems to THE AMERICAN TELEPHONE JOURNAL that, as a good business proposition, the manufacturers of telephone supplies throughout the country ought to combine for the purpose of testing the constitutionality of these Connecticut laws.

Once eliminate hostile laws from the situation in Connecticut, a wonderfully lucrative territory would be open to the Independent manufacturers. Connecticut has only eight counties, but it has one hundred and sixty-six towns with a population of a million people. The hum of business is heard throughout its borders from Monday morning to Saturday night. The telephone, under modern conditions, is as vital to industrial and commercial Connecticut as steam itself. Hostile law and that alone prevents Independent telephone companies from swarming over the State, from invading prosperous and populous towns, from stretching their network of wire and going to the relief of the people. To-day there are but eight towns with Independent service.

The middle West has been a great mine of riches to the Independent telephone manufacturers. The wonderful growth of Independent telephony in this territory has built up great factories, has given employment to thousands of people and an impetus to telephone industries which has been simply enormous. The population of New England is much more congested. With Connecticut well in hand, that whole section would fall in line, and a territory would be developed far more valuable to the Independent manufacturers than has been the middle West. This is not sentiment; it is business. The manufacturers have a great opportunity. Connecticut, with its hostile laws, has barred the progress of Independent telephony and the telephone industry long enough.

AN OPPORTUNITY FOR MANUFACTURERS.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

INDEPENDENT INTERESTS IN CONNECTICUT.

IN 1900 before a Superior Court judge at New London, Conn., an application was made by representative business men for a "finding of public necessity and convenience" to establish another telephone system in New London. The case was fought by the "Bell" interests successfully. While hundreds testified that another system was necessary on account of high rates, poor service, etc., the argument of the Southern New England Telephone Company (Bell) was that they were *willing* to supply all telephones required, *or that were necessary,* at a reasonable rate. They considered the rates reasonable, as their company was only paying 6 per cent. on their stock. The judge decided that another system *was not necessary.*

The Farmington Valley Telephone Co. started to build a line last fall over what is known as Town Hill, New Hartford, Conn. Two property owners held them up over the setting of five poles. The county commissioners were called upon, and, after a hearing, a location was given to set the poles along the highway on the disputed land. The company at once set the poles and strung the wire, establishing the desired connection. The property owners then took an appeal to the Supreme Court to have the line ordered removed. This hearing was held in January and was decided against the company, the court deciding that as the company was not in operation in New Hartford prior to May 3, 1899, the extension of their line was illegal. The same hearing was reopened in April to admit new evidence. Although the company claimed they were not doing an exchange business in that town, Judge Roraback decided against them, but issued no order pending further action on the part of the telephone company. Application was then made to the Superior Court for a finding of "public necessity and convenience" for the extension in question. Much to the surprise of the Farmington Valley people, no opposition was made to the application, only two witnesses being heard. The judge then granted the decree. This shows that in some sections of Connecticut some system is necessary other than the Bell, so that in time a footing may be secured even in Connecticut.

PLEADING IN TENNESSEE COURTS.

UNDER Shannon's Code, providing that defendant may enter a general denial of plaintiff's cause of action, equivalent to the general issue, a plea of not guilty in an action for wrongful death, in which it is averred that defendant negligently constructed and maintained its telephone wires in a dangerous manner, is not such an implied admission as relieves the plaintiff from showing that defendant had any connection with the construction or maintenance of the wires. Cumberland Telephone & Telegraph Co. v. Floyd (Tenn.), 79 S. W., 795.

VALIDITY OF EXCLUSIVE FRANCHISE.

H. L. MARAMAN brought suit against the Ohio Valley Telephone Company in the Bullitt circuit court of Kentucky for an injunction restraining the defendant from erecting poles and stringing telephone wires along the highways of Shepardsville, Ky., and thereby interfering with and encroaching upon his exclusive privilege or franchise of operating and maintaining a telephone system in that municipality. Upon final hearing, his preliminary injunction was dissolved and this judgment of the circuit court was afterwards affirmed by the Supreme Court. The original ordinance, authorizing the sale of the exclusive privilege was passed by the board of trustees of the city the same night it was introduced, and at a called meeting. The Kentucky statutes provide (Section 3699 of 1899) that "no ordinance or resolution granting any franchise, should be passed by the board of trustees within five days after its introduction, nor at any other than a regular meeting." The ordinance ratifying the sale of the exclusive franchise to the plaintiff was also passed at the same meeting in which it was introduced. The court held both these ordinances void because of these infirmities, and decided that being void, the plaintiff acquired no rights, exclusive or otherwise, to operate a telephone system in Shepardsville. Maraman vs. Ohio Valley Telephone Co. (Ky.), 76 S. W., 398.

NOT DOING AN EXCHANGE BUSINESS.

THE case of the Farmington Valley Telephone Company, of New Britain, Conn., against whom suit was brought by Seth Payne, of Town Hill, New Hartford, to have the company's line of poles removed, was reopened in the Superior Court to admit new evidence. The company contended that it was not doing an exchange business in Hartford under the telephone law of 1899, but operated an "interior" system. The principal testimony for the plaintiff was depositions of numerous Bell concerns. Their testimony was to the effect that they had never heard of an "interior" system. The defence introduced numerous witnesses, all of whom testified that an "interior" system was a common term, known to the telephone trade to distinguish between a system operated as an exchange having an operator and a system in which no central operator was employed. The judge reserved his decision. This case is of special interest to telephone men, as it is the first case brought under the infamous Connecticut laws of 1899.

CONTRACT WITH SUBSCRIBERS.

THE Atlanta Standard Telephone Company, at Atlanta, Ga., sued one Porter in a justice court upon an account for $16.80 for telephone service. The jury rendered a verdict for the defendant, who set up as a defence, failure of consideration. The case finally reached the Supreme Court of Georgia, where the judgment was reversed. The case turned upon the construction of a written contract between the parties wherein the defendant agreed to pay to the plaintiff, "as an annual rental for exchange service charges, the sum of $36.00, payable in quarterly instalments in advance for a period of five years." This contract also contained the following provision: "If the service is interrupted otherwise than by negligence or wilful interference of the subscriber, a rebate at the rate herein above specified, shall be made for the time such interruption continues after reasonable notice, in writing to the company. No other liability shall, in any case, attach to the company." The defendant testified that "the telephone was put in and remained in until this suit was filed," and that he "never gave the company any written notice of interruption of service before this suit was filed." The court held that the subscriber could not escape liability for the stipulated rental because of bad, improper, or useless service, without first giving to the company notice, in writing, of an interruption of service. Hence the court ruled that the admission of testimony on the part of the defendant tended to show bad, improper, and useless service, was an error for which judgment should be reversed. The court said that under this contract non-liability of the defendant for the rental and liability of the plaintiff to rebate the same, amounted to the same thing. It held that "interrupted service" must be construed to mean, not only a total cessation of a service once begun, but any service falling short of service reasonably suited to the purpose intended.

Atlanta Standard Teleph. Co. vs. Porter (Ga.), 43 S. E. 441.

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IN THE OPERATING FIELD.

TOLL RATES IN SOUTHERN CALIFORNIA.

THE tariff question, which has been agitating Independent companies of the East for some time, appears to be handled very successfully by the Independent companies in southern California. The rate schedules are divided into seven different groups, which vary from 25 cents for three minutes to 25 cents for a quarter of a minute. In this way a party pays for only just such time as he talks. For instance, the rate between Los Angeles and Santa Barbara, distanced 125 miles, is 25 cents for the first quarter minute, 35 cents for a half minute and 50 cents for one minute. Below will be found a key to the rates, which will give some idea of how a successful solution has been found for toll rates:

Rate No.	¼ Min.	½ Min.	1 Min.	3 Min.	5c. each additional
1				25c.	½ Min.
2				15c.	1 Min.
3		25c.	40c.		½ Min.
4	25c.	35c.	50c.		¼ Min.
5	25c.	40c.	75c.		¼ Min.
6	25c.	50c.	$1.00		10 Sec.
7			25c.		½ Min.

It will be seen from the above schedule that the time limit has been reduced to the smallest practical value; so that in this way toll lines are kept free from delays, caused by parties using the line simply to use up the time when a flat rate of so much per three or five minutes, as the case may be, is used.

TAXATION IN WISCONSIN.

THE legal opinion of the city attorney of Stevens Point, Wisconsin, upon the action of the council in an effort to maintain a license tax on the poles of the Wisconsin Telephone Company is of interest in Milwaukee, inasmuch as Milwaukee recently took similar steps.

The attorney at Stevens Point advises the council that its move its not defensible; that in his opinion it would be futile to file an answer in the case, and, in fact, the telephone company has been advised to perfect judgment in the suit.

In the Milwaukee ordinance the telephone company is taxed one dollar per annum for each pole maintained in the city, and ten cents per year for each cross-arm used.

ARRANGEMENTS FOR TOUR OF FOREIGN ELECTRICAL ASSOCIATIONS TO ST. LOUIS.

THE American Institute of Electrical Engineers has made elaborate arrangements for the tour of the United States of foreign engineers and associations which will participate in the International Electrical Congress to be held at St. Louis during the week of Sept. 11. The programme so far outlined is as follows:

The tour will start from Boston Sept. 3. Visits will be made to the various power houses in Boston, to the Massachusetts Institute of Technology and to Harvard University; from there the company will go to New York and spend Sunday and Monday in New York City. Arrangements have been made whereby the party will be the guests of J. G. White & Company on a steamboat excursion up the Hudson or down to Coney Island. Excursions will be made to the power houses in New York City, and on the evening of the 5th a reception and dinner will be given by the American Institute of Electrical Engineers to all foreign visitors. Tuesday will be spent in Schenectady, where the party will be entertained by the General Electric Company. September 7 and 8 will be spent in Montreal, and Niagara Falls will be visited on the 9th, special excursions having been arranged down the Gorge, and visits will also be made to the power houses of the various companies whose power is furnished by the Falls.

Passing through Canada and the city of Detroit, Chicago will be reached on Saturday, Sept. 10, where the party will be the guests of the Local Reception Committee. St. Louis will be reached Sept. 11, when the party will be taken to the Hotel Jefferson, which will be the headquarters of most members of the association during their stay in St. Louis. The Congress will open at 9:30 A. M. on Monday, Sept. 12, and the proceedings until Saturday, Sept. 17, will be as already outlined.

The train will leave St. Louis at 8 P. M. on Saturday, Sept. 17, and will arrive in Pittsburg at 3 P. M. Sept. 18. On Monday special cars will take the visitors to the offices and works of the Westinghouse Electric & Manufacturing Company. After visiting these works the party will be guests of the Westinghouse Electric & Manufacturing Company at luncheon. In the afternoon, visits will be paid to the Edgar Thompson Steel Works and to the foundries of the Westinghouse Air Brake Company. Tuesday, Sept. 20, will be spent in Washington, and on the 21st the party will visit points of interest in Philadelphia, leaving there the same afternoon for New York.

The American Institute of Electrical Engineers has gotten out a programme of the tour, which deals very thoroughly with railroad and hotel rates and also with a general outline of the tour. The cost of a ticket for this special tour, including railroad fares, sleeping car berths, hotel accommodation, including time spent in St. Louis, meals and all necessary expenses from New York and back, will be $150. This rate, however, does not include hotel expenses in New York City or the expenses of the Boston trip previously referred to, and does not include the admission to the grounds of the Louisiana Purchase Exposition.

ELGIN TAXES CHICAGO TELEPHONE COMPANY.

THE city of Elgin, Ill., is preparing for its legal battle with the Chicago Telephone Company, in which it is endeavor- to compel that corporation to pay a tax of one dollar on each telephone in use in that city. Should the city win its its suit, an attempt will be made by other cities to place a tax on such instruments, and the telephone people will put up a hard fight and carry the question to a court of last resort.

The company holds that it already pays a tax on the instruments as personal property and that it would simply mean submitting to double taxation. The city, on the other hand, insists that the charge is in the nature of a license for the use of the telephones and the law is as legal as is the law to license a peddler's wagon after a personal tax has been paid on the wagon itself.

A PROSPEROUS GEORGIA COMPANY.

THE report of President W. A. Bisbee of the Georgia Telephone and Telegraph Company, at the annual meeting of the stockholders, showed that the last year was one of the most prosperous in the history of the corporation.

An increase of gross earnings amounting to $5,060.87 was shown, with a decrease in operating expense of $2,450. For improvements in the way of new pole lines, additions to the switchboards, installing new telephones, replacing overhead wires, taking out old cable terminals, and the like, nearly $18,000 had been spent, bringing the system up to a high state of efficiency.

The report showed that there were in use 2,264 stations, a substantial increase over the number for the year before.

Two achievements noted were the putting in of a Georgia

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switchboard at the Southern Cotton Oil Works, carrying twenty-eight instruments, and the contract for putting in a switchboard at the De Soto, with a capacity of 280 telephones, 255 of which are to be installed at once, in the rooms of the hotel.

A semi-annual dividend of $3 per share and of 3 per cent. on the stock debentures was declared, distributing about $8,000 among the stockholders.

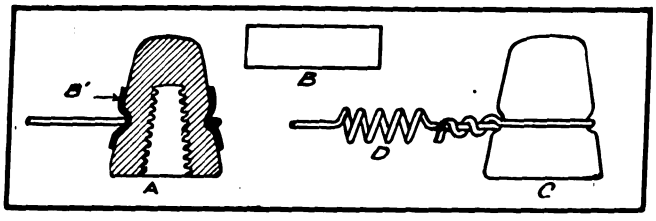
The following officers were re-elected: President and general manager, W. A. Bisbee; vice-president, J. H. Estill; treasurer, C. S. Kenyon; secretary, W. V. Davis; W. A. Bisbee, L. Adler, W. W. Mackall, J. H. Estell, H. Myers, H. P. Smart and J. Paulsen, directors.

TO INVESTIGATE TELEPHONE SYSTEMS.

THE matter of granting a franchise to the Newport (N. H.) People's Independent Telephone Company is now held up for the purpose of making an investigation of independent telephone lines elsewhere. A commission is to be chosen by the selectmen for that purpose, and the expenses of the investigation are to be paid by the parties interested.

MEANS TO STOP HUMMING.

THE following ideas are suggested to stop humming. Each has been tried and found satisfactory: The method illustrated at Fig. *A* is to take a piece of rubber, *b*, long enough to go around the insulator, and place it in the groon as shown at *b'*; then put on the wire and fasten in the usual manner.



The other method is to make a spiral of the line wire about two feet long and arrange it to be about ten feet from the insulator. This method has the additional advantage that it tends to take the strain off the insulator during a high wind, and consequently it is not so liable to be broken or pulled off. This method is shown at *d* in Fig. *C*.

SOUTHERN CALIFORNIA NEWS.

THE Home Telephone Company, of Longbeach, Cal., has begun the work of installing a complete central energy system that will have an ultimate capacity of 1,000 lines, 300 of which will be equipped at once. The plant will be in operation about Nov. 1.

San Pedro is situated on the opposite side of the bay, and possesses a fine natural harbor, upon the improvement of which the Government has spent nearly $2,000,000. The future of this city, in view of the Panama treaty, is very bright. At present there is but one toll line to Los Angeles, but as soon as the business warrants others will be constructed.

COMPETITION LEADS TO BANKRUPTCY.

THE first meeting of the creditors in the bankruptcy of Dr. A. W. Chamberlain of Stratford was held at Webster City, Iowa, recently. The doctor's liabilities are about $10,000 and his assets about $4,000, of which a large part is exempt. The hearing was held before W. J. Covil, referee in bankruptcy for this district.

Dr. Chamberlain's venture in the telephone business was in opposition to the E. H. Martin Company, which maintained a system at Webster City, Iowa. The reason for this competition is not clear, since the E. H. Martin Company was thoroughly Independent; however, the Chamberlain Telephone Company was organized and some plants installed. The service given did not realize the hopes of the investors and patrons, and finally the Webster City and other plants were discontinued. Eventually the whole, including the franchises, was sold to the Hamilton County Independent Company for $6,000.

The size of the claims which soon began to be pushed against Dr. Chamberlain forced him into bankruptcy, which proceedings are now in the course of litigation. The $4,000 in assets which the doctor holds includes his home, medical library, team, etc., which will be exempt in the bankruptcy and cannot be taken by the creditors. The latter will probably realize but a few cents on the dollar.

INTERESTING FACTS FROM SALT LAKE CITY.

THE recently opened exchange of the Utah Independent Telephone Company in Salt Lake City started with 1,600 subscribers and now has 1,800. New contract are coming in at an average rate of 40 per day without any soliciting. The information bureau is especially noticeable, for in addition to many other innovations, it is furnishing all the hotels, etc., with accurate and timely train reports up to the minute, giving them a card to keep the report on.

The service of the Rocky Mountain Bell Telephone Company, says the *Daily Reporter* of Salt Lake City, has been worse, if possible, since the Independent Company commenced, than it was before. A wait of one or two minutes before the operator answers is not unusual, and when a connection is made, it is likely to be with the wrong number as not.

One reason for this is that all the best operators are going over to the new company, attracted by higher wages and a chance to better general conditions. This, as much as anything else, will cause the old company to come into disfavor with the public.

A business concern that allows a rival company to do this for the sake of a few dollars is as good as lost. The Independent company could ask nothing better than a policy of this kind on the part of the Bell people. The company that has the best operators and workmen will give the best service, and the company that gives the best service will get the business.

THE BELL IN MISSISSIPPI.

IN a report from Jackson, Miss., the methods of the Cumberland Telephone Company are once more brought to light. Chancellor Robert Mayes, of that district, has filed with the Railroad Commission a bill of complaint against the Cumberland Telephone & Telegraph Company. The bill sets forth that up to the beginning of 1899 the Cumberland Company had an exchange in the town of Hazelhurst, while there was a local system in Hazelhurst reaching Jackson, Macomb City, Point Gibson, Utica and other points, including Brown's Wells. The company bought out the local system and allowed it to go out of existence.

The complaint sets forth that the Cumberland Company allowed the line to Brown's Wells to get in very bad repair, and although it remained that way for a long time, yet continued to collect tolls. When a subscriber threatened to make a complaint the telephone company threatened to cut out the line. The bill goes on to state that this course of conduct has been going on for several years, and the people subscribing for the telephones are getting tired of this kind of intimidation. The Railroad Commission is asked to come to the relief of the subscriber and compel the Cumberland Company to keep up its line.

TELEPHONE OPERATORS IN GERMANY.

IN the German telegraph and telephone service all grades of positions are open to women, though the rules of admission are very strict, and no women with children are employed. Four thousand women are now engaged in the telephone service of the German Empire, it is stated, 1,000 of them being in Berlin. The hours are light, ranging from six to eight a day.

The highest pay which a woman can draw in German telephone offices is $357, which is said to afford a comfortable living in Germany, but is a low wage compared to that obtained in England, where experienced telephone clerks get $600 and chief supervisors are paid as high as $1,550. In Germany, however, it must be noted that women on their withdrawal from active labor after the prescribed number of years of faithful work are awarded a Government pension on the same plane with men.

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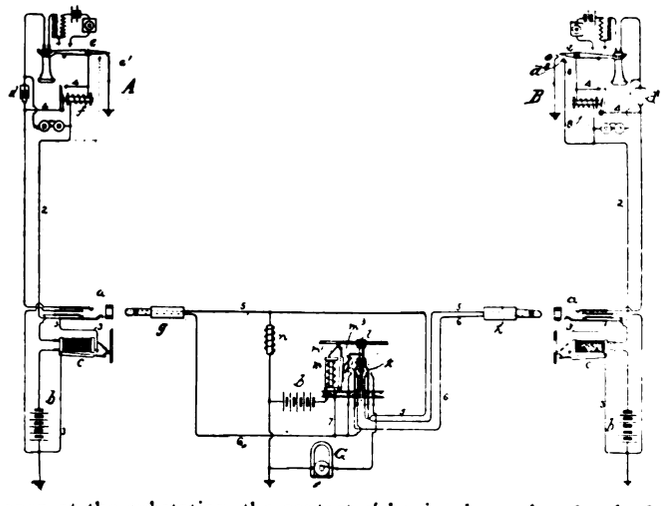
TELEPHONE PATENTS

SIGNALLING SYSTEM FOR TELEPHONE EXCHANGES.

C. E. Scribner, of Chicago, Ill., patents (No. 763,803) and assigns to the Western Electric Company, of Chicago, an improved signalling system. This is shown in the accompanying illustration and is best understood by a description of its operation, which is as follows: The subscriber signals by removing the telephone. As the switch-hook *e* rises it touches the contact *e'*, sending an impulse through the line, exciting and displaying the signal *c*. When the disc of this signal rises it short-circuits the line and is locked in its former position, when the operator observes the signal she inserts the answering plug, obtains the order and replaces the plunger *l* to transmit a call signal. The insertion of the answering plug separates the line springs, cuts off the battery *b* and signals *c*, breaking the local circuit *3* so that the line signal is restored and battery *b* is connected to the line through the plug-circuit, said battery being bridged between conductors *5* and *6*, with the impedance coil *n* on one side and the magnet *m* on the other side. The plug and spring jack are so constructed that the sleeve of the plug which is connected with the free pole of the battery will not touch the longer line spring until said spring has been raised from its contact so as to cut off the line signal. The magnet *m* will not receive current when the answering plug is in the circuit, because the circuit of that line is



open at the substation, the contact *e'* having been closed only for an instant. When the plunger *l* is depressed the ringing springs are connected to the line and ringing current supplied. When the called party answers, the circuit of conductor *2* is momentarily closed at contact *e'* and an impulse from battery *b* flows over the circuit, energizes magnet *m* and draws up its armature. The detent *m3* is thus released and the ringing key tripped and returns to its normal position. This breaks circuit of the battery and generator. As soon as the sprinks *k k'* touch their inner contacts the battery is again bridged. During the interval of time while the springs *k k'* are returning to their normal position, the battery is cut off, the relay *f*, which may have been drawn up, will fall back, leaving the line circuit open. The ringing key must be designed to act sluggishly so that the armature of relay *f* will have time to be retracted before the springs *k k'* sever their contacts. When either subscriber replaces his receiver, the switch lever closes the circuit momentarily and relay *f* is drawn up and is not short-circuited, the bridge *4* remains closed so that the battery will flow continuously over the line and display signal *m'*.

TELEPHONE FIRE ALARM SYSTEM.

W. L. Denio, Rochester, New York, patents (No. 762,391) and assigns one-half to Hobart F. Atkinson, of Rochester, an improved fire alarm system. The essential features of this system consist in locating one or more thermostats in various parts of the building to be protected in a circuit or circuits, each one communicating with the telephone circuit and connected with an electromagnet arranged to be energized by the closing of the circuit by the thermostat. This magnet unlocks the vibrating pendulum driven by an escapement wheel which operates at *V* which projects up, touching the lever *W*, and sends a series of

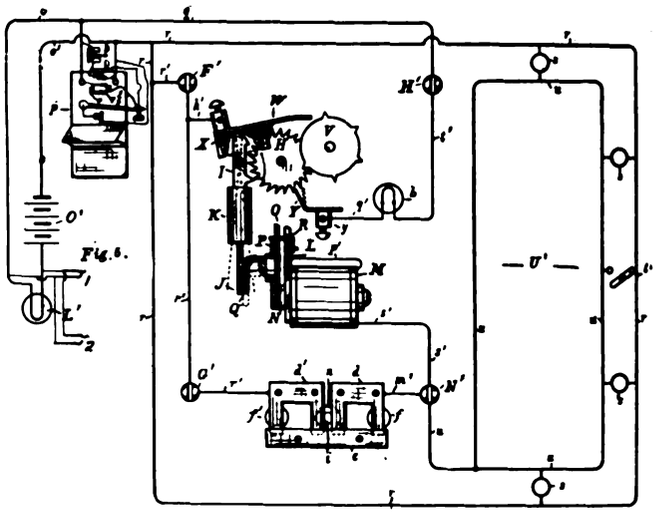


Fig. 6.

impulses to the central office. These impulses act upon the signal lamp and causes it to flash as many times as there are projections in the wheel *V*. These projections operate in this manner to convey to the operator a number indicative of the point at which the thermostat is operated and by this means may be interpreted as a signal of fire.

IMPROVED LAMP JACK.

W. Kaisling, of Chicago, Ill., patents (No. 763,404) and assigns to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., an improved lamp jack. The object of the invention is to provide an improved lamp jack, which the inventor accomplishes in the following manner: Fig. 1 is a front elevation.

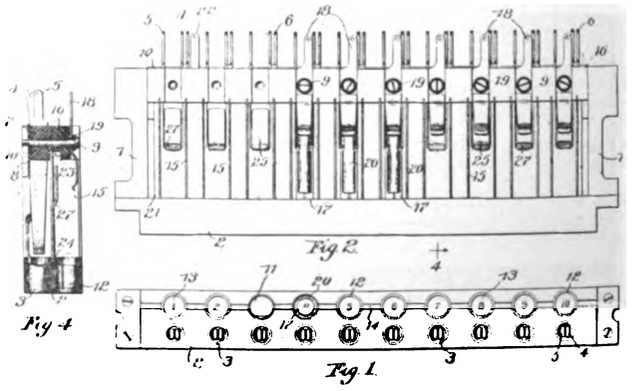


Fig. 4

Fig. 2.

Fig. 1.

There is a front piece *2* to which the thimbles of the lamp jacks and the telephone jacks are secured. The telephone jacks are arranged in the ordinary manner, and consist of a set of springs which are held in insulating strips *7* and *16* (Fig. 4.) The essential feature of the lamp jack consists of a base plate which extends from one end to the other of the bank. This base plate is shown at *24* in Fig. 4. In the base plate a series of springs *27* are punched, and thus one terminal of all of the lamps becomes common and is connected to the battery in the proper manner. The other terminal consists of an individual spring *15* for each lamp and is secured by means of the screw *9* to the rear insulating strip *10*.

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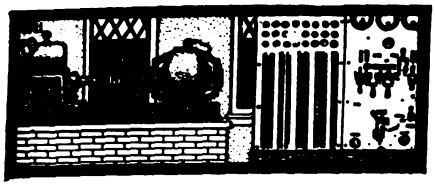

QUERIES

Questions on any subject relating to telephony will be answered on this page.

DYNAMOTOR—MOTOR GENERATOR.—(379.)

Please explain the difference between a dynamotor and a motor generator. E. H. C.

The sketches, Fig. 379a and 379b, show roughly the main constructional points of difference. Fig. 379a is the dynamotor and 379b is the motor generator. A dynamotor is a machine, a combination motor and dynamo, for changing current from

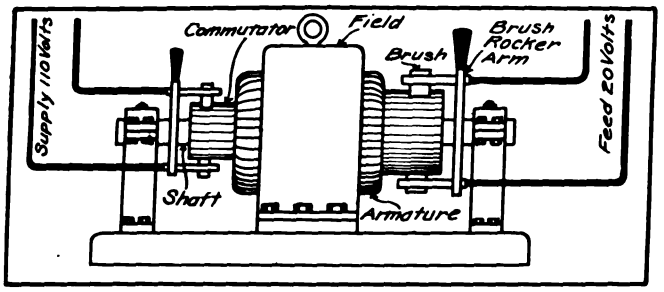

Fig. 379a.

one voltage to another, and has but one magnetic field, in which the armature windings of both the primary and secondary circuits revolve. Usually both of the windings are on the same armature, but sometimes they are on separate armatures. On account of the neutralizing action of the motor and dynamo armature windings there is no field distortion; consequently a shifting of brushes is not required with a change of load.

These machines are more efficient than motor generators, as there is but one field winding to consume energy; but they cannot be compound wound to insure a steady voltage at the dynamo end, as the effect of such compounding would be to lower the motor speed. For these same reasons it is not possible to regulate the dynamo voltage by field regulation, as any change in field strength would change the motor speed. The only way to regu-

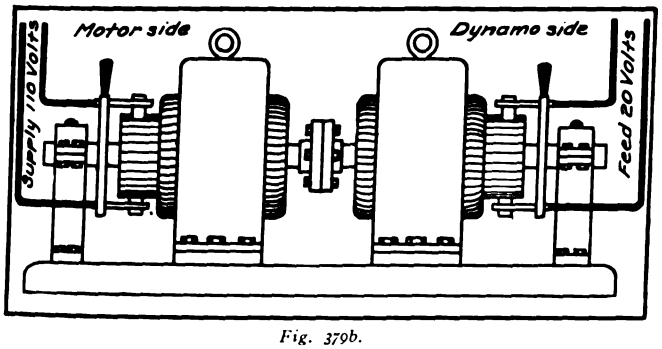

Fig. 379b.

late voltage with a dynamotor is to insert resistance in the main circuit, which is very wasteful. Where voltage regulation is desirable dynamotors are not.

A motor generator is an arrangement for transforming voltage, and consists of two entirely separate machines, a dynamo and a motor, with their armatures on the same shaft. Any winding can be applied to the dynamo, and any system of field regulation may be used, as the machines are as distinct as if they were belted together and were in separate buildings. Motor generators for storage battery charging are usually shunt wound. The drawings show an instance where current is received at 110 volts and delivered at 20 volts.

SLOT MACHINES.—(380.)

Will coin slot telephones work on a grounded line, or must it be metallic? Some lines will be 20 miles long with 10 or 12 telephones to a line. J. C.

This depends entirely upon the type of slot machine you are considering. A large proportion of the slot machines manufactured to-day give the signal by means of a sound. In this case an operator is required to listen for the signal when the coin is deposited in the slot. This type of instrument being entirely mechanical, it makes no difference as to whether the circuit is grounded or metallic.

There are other devices which are not coin collecting machines, but are meters of one description or another, which to be successfully operated require metallic circuits. This is due to the fact that a difference of potential may exist between the point where the line is grounded and where the exchange is situated, which would tend to neutralize the effect of any current sent over the line to operate the meter.

SIMPLEX COILS.—(381.)

In regard to impedance coils in simplex circuits (334), May 21 number, what should be the resistance of the two windings in series, what size wire, and what kind and size of core, for use on a bridging circuit with 1,600-ohm ringer magnets, should a coil as described above have? R. T. S.

The coil in question, a cross section of which is illustrated in Fig. 381, has four windings of 2,400 turns each of No. 29 silk covered wire, coil No. 1 inside and coil No. 4 outside, connect together to form one-half, which gives 4,800 turns and a resistance of 120 ohms. Coils No. 2 and No. 3, both middle coils, are connected together to serve as a second half, also give 4,800 turns and a resistance of 120 ohms. The core is made up of annealed iron wires 13½ inches long bent back over the winding so as to overlap and form what is sometimes called a hedge-

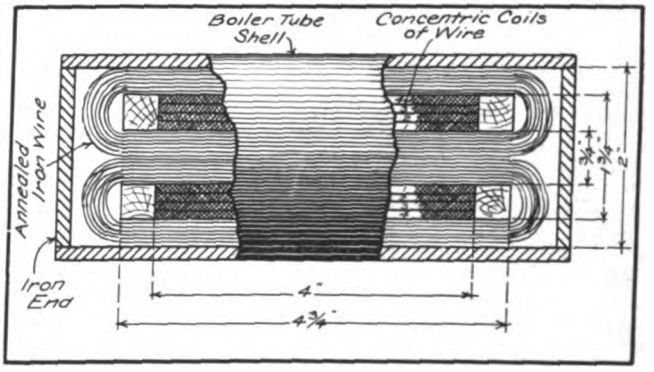

Fig. 381.

hog transformer. A shell of boiler tube encloses the completed coil and serves as a shield for the magnetic lines which would otherwise cross talk in adjacent coils. The impedance of this coil will be great enough to allow it being placed in a bridge circuit with 1,600 ohm ringers, regardless of the low resistance of its two windings in series, 240 ohms. If the wire is wound parallel two spools of No. 29 wire will be necessary to wind from; the wire, being wound side by side for the 4,800 turns. This will give the best balance, but is rather difficult to wind and is more liable to break down as two wires of the two coils are side by side for their entire length.

GRAVITY CELL.—(382.)

I would be glad to know whether or not the deposited copper should be cleaned off the copper element of gravity cells when renewing. Give reasons for answer given. L. S.

As the positive element of a gravity cell is of copper, and as the deposit that accumulates on it during the action of the cell is also copper of the purest description, there is no necessity of cleaning off this deposit when the cell is renovated, but the copper which is deposited is likely to be brittle, so that particles may be dislodged and accumulate on the zinc. This causes local action, and for this reason it is desirable to brush the copper with a stiff wire brush when the cell is cleaned in order to dissolve any loose particles.

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THE WEEK'S MESSAGES

FINANCIAL.

SAVANNAH, GA.—The Georgia Telephone and Telegraph Company has declared a semi-annual dividend of $3 per share and three per cent. on the stock debentures.

OBERLIN, KAN.—The Central State Telephone Company, incorporated with a capital stock of $60,000, paid a three per cent. quarterly dividend for the quarter ending June, 1904. This is at the rate of twelve per cent. per annum.

PATCHOGUE, L. I., N. Y.—The Suffolk County Telephone Company has increased its capital stock from $3,500 to $13,500.

CRAIG, MO.—The Craig Telephone Company will vote on a proposition to increase its capital stock.

LACONIA, N. H.—At a recent meeting held by the directors of the Citizens' Telephone Company, a semi-annual dividend of three per cent. was declared.

TROY, N. Y.—The Commercial Union Telephone Company has increased its capital stock from $10,000 to $800,000.

FRANCHISES.

SANTA ANA, CAL.—W. L. Porterfield has applied to the Board of Supervisors for a long-distance franchise for the Home Telephone Company.

ARCADIA, KAN.—The application of the Arcadia Telephone Company for a charter has been granted. The company now has a paid-up capital of $1,250.

ST. LOUIS, MO.—The St. Louis County Telephone Company was given a franchise to erect poles and string wires throughout the county.

HASTINGS, NEB.—The City Council has unanimously voted to grant a thirty years' franchise to the Hastings Independent Telephone Company. Wires in the business portion of the town will be placed underground.

MANITOWOC, WIS.—The Manitowoc Telephone and Telegraph Company has applied to the City Council for a franchise.

COMBINATIONS.

VINITA, IND. TER.—The Indian Territory Telephone Company, with headquarters at Vinita, has sold its local exchange to the Pioneer Telephone Company, Oklahoma City.

MOULTON, IA.—W. C. Stickney has sold his Moulton telephone lines to Clyde Mann, of Woodbury County.

GARDEN CITY, KAN.—Mr. Menke has sold his interest in the Garden City Telephone Exchange to E. L. Wirt.

SALINA, KAN.—The Salina Telephone Company has purchased the Lindsburg and Marquette exchanges, together with connecting toll lines in McPherson, Ellsworth, Rice, Barton and Salina counties. The capital stock of the company has been increased to $100,000. Many improvements and extensions will be made.

MONROE CITY, MO.—The Monroe City Telephone Company has sold its plant to the Buffum Telephone Company.

WEATHERFORD, TEX.—The O. R. Riddle Telephone Company has sold out its entire business to J. G. Brannon and William E. Burke.

POINT PLEASANT, W. VA.—The Point Pleasant Telephone Company has purchased the property, plant and good will of the Mason County Telephone Company.

ELECTIONS.

SAVANNAH, GA.—The annual meeting of the Georgia Telephone and Telegraph Company was held, at which the following officers were elected: W. A. Bisbee, president; J. H. Estill, vice-president; C. S. Kenyon, treasurer; W. B. Davis, secretary. Herman Myers, L. Adler, Jacob Paulsen, H. P. Smart, W. W. Mackall, W. A. Bisbee and J. H. Estill, directors.

BUCYRUS, O.—At the annual meeting of the Bucyrus Telephone Company the following officers were elected: Dr. John A. Chesney, president; H. S. Blair, vice-president; J. F. C. Hull, secretary and treasurer. Dr. John A. Chesney, E. Blair, J. F. C. Hull, Benjamin Shearer, W. H. Miller, H. S. Blair and W. A. Blicke, directors. Albert Unger was appointed manager.

PIQUA, O.—The Miami Valley Telephone Association has elected the following officers: A. F. Bromhall, of Troy, president; Dr. Kessler, West Milton, vice-president; Col. W. D. Rush, Greenville, secretary and treasurer; I. H. Thediceck, L. E. Simes, L. M. Flesh, executive committee.

CALIFORNIA, PA.—At the annual meeting of the stockholders of the Union Telephone Company, the following officers were elected: W. C. Smith, president; T. J. Underwood, vice-president; A. F. Moses, secretary, and H. L. Lamb, treasurer and manager. The directors are W. C. Smith, L. J. Underwood, A. F. Moses, H. L. Lamb and L. F. Baker.

POINT PLEASANT, W. VA.—At a recent meeting of the stockholders of the Point Pleasant Telephone Company the following officers were elected: W. M. Haynes, president and general manager; E. J. Mossman, vice-president; T. Stribling, secretary and treasurer; J. S. Spencer, attorney. E. J. Mossman, T. Stribling, J. S. Spencer and E. B. Jones, directors.

UNDERGROUND.

NEW CASTLE, PA.—All electric, telephone and telegraph wires will be placed underground.

PERSONAL.

W. B. BENTLEY, superintendent of exchanges of the Cincinnati & Suburban Telephone Company, has resigned; he is succeeded by J. E. Peavey.

ALFA EVANS has been appointed manager of the Whitewater exchange of the Wisconsin Telephone Company.

O. J. HAWKINS, connected with the Home Telephone Company, of Cohoes, N. Y., was the lucky winner of a drawing for a free trip to St. Louis.

BARTON JONES has been appointed manager of the Moody exchange of the Southwestern Telephone and Telegraph Company.

CHARLES KESTER has been appointed secretary and manager of the People's Mutual Telephone Company, at Hillsboro, Ill.

MAX STADT, the fuse inventor, has organized a company at Los Angeles to be known as the Los Angeles Tool and Die Manufacturing Company.

MELVIN SAUNDERS has been appointed manager of the Valley Telephone Company, of Bay City, Mich.

A. L. WATERBURY, formerly vice-president and general manager of the Citizens' Telephone Company, Houston, Tex., has accepted the position as general manager of the sales department of the American Conduit Company. Mr. Waterbury will have his headquarters at the Chicago office of this company, 1005-1006 Manhattan Building.

MISCELLANEOUS.

LOS ANGELES, CAL.—The material for the completion of the Home Company's exchange has arrived and work will be pushed to completion, which will be about August 1st.

COVINGTON, GA.—The Covington Telephone Company's exchange was destroyed by fire recently.

CLINTON, ILL.—Lee Summers has a new telephone line up as far as Liberty.

MOLINE, ILL.—The Union Electric Company, of Moline, has been awarded the contract for the installation of telephones of the public schools in the city.

TULSA, I. T.—The Indian Territory Telephone Company, with headquarters at Vinita, has sold its local exchange at this place to the Pioneer Telephone Company, of Oklahoma City, for a consideration of $10,000. The purchasers will enter upon the business at once. The trade carries with it the business of three long-distance lines centering here, with connections in Texas, Oklahoma, Missouri and Kansas. The system is a central energy and one of the finest in either of the two territories. Less than two years ago it was purchased from other parties for less than $6,000. It has been on a paying basis ever since.

COUNCIL BLUFFS, IA.—A special telephone committee of the Commercial Club has reported to the directors that there is plenty of money in sight to back a mutual telephone company that will connect with the Independent lines entering the city.

ALMA, MICH.—The Union Telephone Company will spend $50,000 in enlarging its system.

NORTHFIELD, MINN.—At a meeting of the Common Council, the Tri-State Telephone and Telegraph Company was granted permission to run its line to the city and establish a toll station.

KANSAS CITY, MO.—The Home Telephone Company's plant sustained considerable damage by the recent floods.

KANSAS CITY, MO.—All telephone and telegraph companies having lines in this city have been notified that they are not to put in any more anchor poles. They will have to devise some other means of anchoring their poles.

VANDALIA, MO.—The farmers owning the rural lines coming into Vandalia held a meeting recently and decided to install and operate a switchboard here.

UTICA, N. Y.—Because of remarkable success in securing contracts, the Utica Home Telephone Company has secured larger quarters for its switchboard at Whitesboro, four miles west of Utica. The change was made in eight hours and forty-one minutes, the number of lines entering the switchboard being 225.

TYRO, O.—About thirty telephones were burned out during the thunderstorm last week.

MITCHELL, S. D.—F. B. Else has sold out his interest in the local telephone exchange.

NEW COMPANY NOTES.

ALBION, ILL.—The Edwards County Mutual Telephone Company has been organized with a capital stock of $8,000.

MAYVIEW, ILL.—Farmers in this vicinity held a meeting for the purpose of organizing a farmers' telephone company.

SHELBYVILLE, ILL.—The Rose Township Mutual Telephone Company, of Shelbyville, has been incorporated with a capital stock of $1,020, by Philip Roesler, George Ruff and Jacob Kull.

TAYLORVILLE, ILL.—The Taylorville Home Telephone and Telegraph Company has been incorporated with a capital stock of $75,000, by Henry W. Carter, George E. Waldo and C. M. Smith.

WILMOT, IND.—The Wilmot Mutual Telephone Company has been organized with a capital stock of $10,000. It will absorb the Etna Telephone Company, and will have direct connection with Etna, North Webster, Cromwell, Ligonier, and the lake resorts of that region.

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ADAIR IA.—The Grant & Audubon Township Mutual Telephone Company has been incorporated with a capital stock of $3,000.

BOW CREEK, KAN.—The Bow Creek Telephone Association has been incorporated with a capital of $2,000, to give telephone service to the towns of Bow Creek, Marvin and Stockton. The officers are: Evan Hebrew, president; J. M. Elliott, vice-president; E. A. Stroup, secretary, and J. A. Hebrew, treasurer.

DENISON, KAN.—The Broken Arrow Telephone Company has been incorporated with a capital stock of $5,000.

FRANKFORT, KY.—The Big Leather Wood Telephone Company has been incorporated with a capital stock of $2,500.

RANDOLPH, KY.—The Randolph & Hiseville Telephone Company has been incorporated with a capital of $500, by L. B. Strader, J. H. Owens and E. Evans.

SHAKOPEE, MINN.—The Farmers' and Merchants' Telephone Company, of Shakopee, has filed articles of incorporation. The capital stock is $10,000.

BOONEVILLE, MISS.—The Citizens' Electric Light and Telephone Company, of Booneville, has been incorporated with a capital stock of $2,000, by J. V. Sanders, L. N. Phillips and others.

LEETON, MO.—The West Lawn Telephone Exchange has been incorporated with a capital stock of $2,000.

SHELBYVILLE, MO.—The Windsor & Okaw Mutual Telephone Company has been incorporated with a capital stock of $900, by J. W. Herron, J. H. Haste and J. F. Morse.

NEWPORT, NEB.—The Farm and Home Telephone Company has been incorporated with a capital of $5,000, to give telephone service to the towns of Newport, Simpson, Brocksburg, Jamison, Naper, Butte and Anoka. The officers are G. E. Van Every, president and manager, of Newport, and C. M. Thompson, vice-president, secretary and treasurer, of Newport.

CAYWOOD, N. Y.—The Caywood & Lodi Telephone Company has been organized to build a new line from Valois to Lodi and Interlaken.

FITTSTOWN, N. Y.—The citizens of this town held a meeting for the purpose of forming the Farmers' Telephone Company of Fittstown. The following officers were elected: Ernest Abbot, president; Ira Haner, vice-president; J. Van Wert, secretary, and Clarence Herrington, treasurer.

SALISBURY, N. C.—A new telephone company will be organized here. The company is selling its stock rapidly and expects to begin operation very soon.

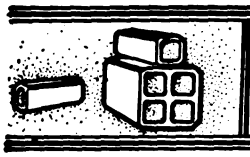
CARROLL, O.—The Carroll Telephone Company has been incorporated with a capital stock of $5,000 by O. B. Brandt, J. P. Gundy, H. A. Brown, J. W. Ash and T. P. Sylvester.

CHATHAM, O.—The Chatham Farmers' Mutual Telephone Company has been incorporated with a capital of $10,000, to give telephone service to Chatham and surrounding country. The officers are: A. B. Horst, of Spencer, president; P. H. Homan, of Medina, vice-president; W. H. Ripley, of Chatham, secretary; A. R. Clapp, of Medina, treasurer, and L. S. Rogers, of Chatham, manager.

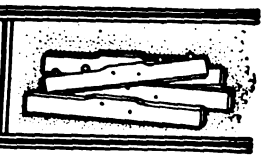
SALEM, O.—The Salem Township Rural Telephone Company has been incorporated with a capital stock of $2,000, by H. A. Halverstadt, E. H. Simon, H. V. Zimmerman and D. W. Brinker.

FREDERICK, OKLA.—The Southern Oklahoma Farmers' Telephone Company, of Frederick, has been incorporated with a capital stock of $20,000, and will construct rural lines covering this section of the country.

CHIPPEWA FALLS, WIS.—The Melville Settlement Telephone Company has been organized. Its purpose is to build lines and connect to the Wisconsin Telephone Company's lines all the farming community. James W. Melville is president and John W. Melville secretary.



New Construction in the Field



LOS ANGELES, CAL.—The Home Telephone Company is contemplating extensive additions to its service.

HOPEDALE, ILL.—The Mutual Telephone Company has received its cable and is overhauling its system here.

PALMYRA, ILL.—The Lee County Telephone Company is rebuilding its line on account of inductive disturbances caused by the trolley road.

PRINCETON, ILL.—An Independent telephone line has put in about a mile and a quarter of cable at the south end of Princeton.

ROCKFORD, ILL.—The Winnebago County Telephone Company will extend its service into Pecatonica.

WOODLAND, ILL.—The Woodland Telephone Company has its line completed to Eden.

WALNUT, IA.—The Musson Telephone Company has completed two new lines southeast of town and connected them to the Walnut exchange.

WINTERSET, IA.—The Hawkeye Telephone Company will erect a two-story building for its central exchange.

FULTON, KAN.—The Osage Valley Telephone Company, of this city, is now working on a six-mile extension of its line, northeast from Mapleton, Kan.

LEAVENWORTH, KAN.—The People's Telephone Company is preparing to expend $30,000 in equipping its system here with the most modern and up-to-date service and instruments.

WICHITA, KAN.—The Missouri & Kansas Telephone Company will install an entire new local system here.

NEW IBERIA, LA.—The People's Independent Telephone Company, Ltd., R. F. Hogsett, proprietor, is extending its pole line from New Iberia to Derouen, a distance of about twelve miles; also from Erath to Bayou Figre.

BANGOR, ME.—Construction on McFaul's telephone line is being pushed rapidly, and it is expected that the full twenty-eight miles will be in working order by the first of August.

BELGRADE, MINN.—A telephone line is to be erected from here to Games Lake.

LUVERNE, MINN.—Work will soon commence on the Springwater-Garretson telephone line.

MARION, MINN.—A telephone line is to be built from Marion to Litchville.

WOONSOCKET, MINN.—The farmers of this town will build a line from this city to Storia and from Storia to Letcher.

FRANKLIN, N. H.—The Citizens' Telephone Company is preparing to build a line up to Hodgdon district. Some new cable construction is also contemplated by the company.

CANASERAGO, N. Y.—A new telephone line will be built from Arkport to this place, connecting with the Interocean line at Arkport. The officers of the company are: Jacob Schwangle, president; Albert Schmill, vice-president; Frank Wilkins, secretary, and Gibbon Manley, treasurer.

HAMBURG, PA.—The Pennsylvania Telephone Company contemplates making extensive improvements to its line between Hamburg and Windsor Castle. New poles will be erected and the entire line will be rewired.

HARRISBURG, PA.—The Pennsylvania Railroad Company is installing a telephone system here to connect with all the offices and departments of the company.

READING, PA.—The Consolidated Telephone Company will expend $100,000 in improvements in Reading and vicinity. A line will be built from Reading to Lebanon and another will be extended from the Conestoga Valley.

WESTERLY, R. I.—The Automatic Telephone Company was granted permission to set poles to Weekapang under the supervision of the Highway Committee.

ABERDEEN, S. D.—The Dakota Central Telephone Company has completed the construction of the new metallic copper circuit between Aberdeen and Sioux Falls.

CANISTOTA, S. D.—The Canistota Telephone Company is contemplating running a new line to connect with the line running from Montrose.

WHEELOCK, TEX.—W. C. Covington and C. Joese will build a line from here to Bryan, a distance of sixteen miles.

WILDROSE, WIS.—The Waushara Telephone Company will build a line from Wildrose to Wautoma to give direct connection between this place and to give farmers along that route telephone service.

ROME, N. Y.—The Rome Independent Telephone Company is planning to make several improvements in order to cope with increasing patronage. Two new sections of the switchboard will be made and 20,000 feet of aerial cable will be strung. At present the company has 1,100 subscribers and several contracts signed, but the telephones have not been placed because of limited accommodations.

CLIFFORD, N. D.—The Trail County Telephone Company is putting in a new exchange at this point.

PORTAL, N. D.—Mark Shanks will install a local telephone system.

CLINTON, O.—The Clinton Telephone Company has arranged for the construction of several new lines.

RAVENNA, O.—The Portage County Telephone Company will build twenty-five miles of line in the extension of its system to Rootstown, New Milford, Edinburg, Atwater Station and Randolph.

INGERSOLL, OKLA.—The Union Telephone Company, of Ingersoll, will build a toll line to Byron.

FLORENCE, ORE.—Fred C. Bean, T. J. Neeley and Charles Saubert will construct a new telephone line from Florence to Mapleton. It will connect with the line which runs from Acme to Florence. The new line building from Junction will connect with the line at Mapleton, thus giving connection with Eugene.

PHILOMETH, ORE.—Construction has started on the Independent line running from this town to Corvalis.

FORESTBURG, S. D.—A telephone line is being constructed from here to Ruskin Park, to be connected with the local system.

CONCORD, TEX.—The Dinana Brick and Tile Company is arranging to build an Independent telephone line from Concord to Beaumont.

ELCAMPO, TEX.—A telephone line will be constructed from Markham to this place.

SHARON, VT.—The Rapid Telephone Company is extending its lines from Sharon to Lake Mitchell.

EVERSON, WASH.—The Bellingham Bay & British Columbia Railway Company is constructing a private telephone line from Hampton and Everson to Lynden.

QUINCY, WASH.—The Babcock-Benson Telephone Company has nearly completed its line from here to Wilson Creek City. A line will be run north to Farmer, Wash.

WILBUR, WASH.—L. Larick and associates have organized the Sans Poil Telephone Company and are building a line from here to Sans Poil, Idaho.

FAIRMOUNT, W. VA.—The Fairmount Telephone Company is building a line between Morgantown and Cheathaven, which will eventually connect with the People's line and give service to Uniontown and various parts of Fayette and Green counties.

BLACK RIVER FALLS, WIS.—The Pierce County Telephone Company is reconstructing its toll lines north of this city.

LARAMIE, WYO.—A new telephone line has been built from Laramie to Rambler Mine, at Douglas Creek.

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TRADE NOTES

THE ELECTRIC APPLIANCE COMPANY, of Chicago, reports an unprecedented demand for its No. 36 X. P. type telephone. This is the instrument which the company guarantees, on a line equipped with twenty of them, to ring the twentieth with eighteen receivers down.

THE MONARCH ELECTRIC AND WIRE COMPANY, of 125-127 South Clinton street, Chicago, is the exclusive Western agent for the "Pneumatic Telephone Receiver Cushion." This receiver cushion will fit any telephone, and prevents shock to the ear as well as improving the hearing whilst listening. It is made of durable rubber, and should last a long time.

C. E. NICHOLAS, of the Nicholas Lightning Arrester Company, of Columbus, Ohio, has opened an office at Columbus to look after the cable work of telephone companies who do not keep a regular cable man. All companies who have cable work of any kind, such as repairs, locations of trouble, should communicate with Mr. C. E. Nicholas, who will be glad to give them all the aid he can.

THE BBOWNLEE LUMBER COMPANY has moved its offices from Meridian, Miss., to Chattanooga, Tenn., where it has erected a factory for the manufacture of cross-arms. This change was necessary to facilitate the handling of the Eastern business. The company will continue to operate its factory at Meridian, and also its warehouse at Cairo, Ill. Orders less than car-loads can be sent to Cairo as heretofore.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, of Buffalo, N. Y., has issued pamphlets describing switchboard protectors, distributing frames, lightning arresters, fuse blocks and combined cut-out switches. Particular attention is given to the description of self-soldering heat coils, and also to the distributing frames designed for this class of arrester. Copies of these pamphlets will be sent on request.

THE BAIRD MANUFACTURING COMPANY, of 24 Michigan street, Chicago, has just received a letter from the Hawaiian Islands, where its pay stations were recently installed. Mr. E. B. Carley, treasurer and superintendent of the Maui Telephone Company, of Paia, has this to say of the Baird pay stations: "I must say that they are a great financial surprise to me, as well as to the directors of our company; they work like a charm."

The W. G. Nagel Electric Co. is now putting on the market a very high quality of cable compound, under the head of "W. D. Insulating Cable Compound."

This cable compound combines all the essentials of a perfect insulating compound, chief among which is perfect insulation and an extremely high melting compound. It is packed in pails, each pail containing an average of eight pounds. To telephone companies desiring perfect insulation the company recommends its use.

THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY, of Meridan, Conn., has placed upon the market several new styles of toll line switchboards which are especially designed for heavily loaded lines. This company has realized the demand for a thoroughly reliable toll line board at a reasonable price and the sale has been very large on this material. A bulletin has been issued, which will be mailed on request, describing this apparatus. The company has also issued a new and enlarged catalogue, No. 8, which will be sent to all interested.

THE FARR TELEPHONE CONSTRUCTION COMPANY, of Chicago, Ill., reports a large increase in business. During the first week of July, orders were received from Mexico, Ontario, British Columbia, New York, Virginia, Kentucky, Nebraska, Michigan, Nova Scotia, Wisconsin, Minnesota, Tennessee, Washington, Illinois, South Dakota, Indiana, Colorado, Onio, Iowa, Missouri and Texas. The company has also gotten up a catalogue which describes its various types of switchboard, magneto instruments, desk sets, extension bells, wire tools and accessories. This catalogue will be mailed upon request.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Savings & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

EXCEPTIONAL BUSINESS OPENING.—Want to meet a man or syndicate that can invest $20,000 cash at once and can furnish credit promptly to the amount of $80,000 more in a telephone proposition near Kansas City, Mo., with or without service. Address—with reference, no agents—Theodore Gary, Macon, Mo. 207

FOR SALE—Switchboards and Telephones, all capacities and makes, Terminals, Cross-connecting Racks, Cable, &c., at less than half cost of new. Guaranteed reliable and efficient. Chicago Telephone Apparatus Exchange, 17 S. Elizabeth St., Chicago, Ill. 184

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

SALESMAN WANTED—For general line of electrical supplies; experienced lamp salesman preferred. State previous experience; give references.. JULIUS ANDRAE & SONS CO., Milwaukee, Wis. 212

POSITION wanted with telephone company in Colorado or Arizona. I have had three years' experience and am an expert lineman and repair man. References furnished. Address Box 206, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 206

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

POSITION WANTED as manager or assistant in small exchange. Applicant is a young, energetic man of 23, with clean habits and affable manner; has a thorough, practical and theoretical knowledge of telephony and is not afraid of work. Best references. Moderate salary. Box 210, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 210

WANTED—A Fisher cable testing set, No. 1 or No. 2, manufactured by Leeds, of Philadelphia. Will pay cash. La Fayette Telephone Company, La Fayette, Ind. 208

SALESMAN WANTED—Man capable of selling instruments, switchboards, and supplies. Territory to be Middle West. State previous experience; give references. JULIUS ANDRAE & SONS CO., Milwaukee, Wis. 211

WANTED—Second-hand Telephone Apparatus, Central Energy and Magneto Switchboards, Telephones, Bridging Bells, Transmitters, Terminals, Cross-connecting and Distributing Racks, Ringing Generators. State details, price, condition and make. C. E. W., 17 S. Elizabeth St., Chicago, Ill. 188

POSITION WANTED—Telephone engineer, seven years' experience in manufacturing and operating companies, strictly temperate, honest and energetic, desires position as manager or wire chief. Good recommendations furnished. Address Box 213, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 213

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AS FAR AS WE ARE CONCERNED

the Pole shortage is over. We have carload (and in some cases trainload) lots, of every size from 4 inch twenties up. Our stock is graded up to the same high quality as always.

What Sizes do you want Prices on?

MALTBY LUMBER COMPANY, 512 Phoenix Block, Bay City, Mich.

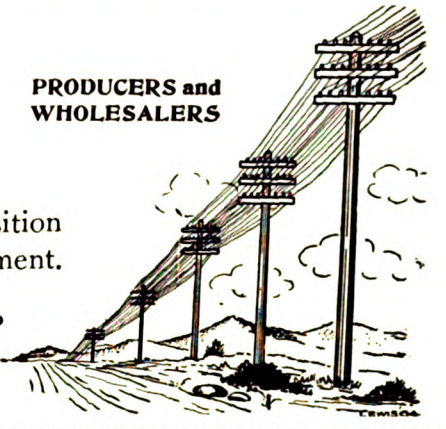
Pittsburgh Agents, TIPPER & PATTON, 512 Bessemer Building.

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



Idaho Cedar Poles

PACIFIC COAST POLE CO.

SPOKANE, WASH.

WHITE CEDAR POLES

Low prices for all sizes, but just now SOMETHING SPECIAL on 6 in. 25, and 6 in. 30 ft. Poles.

WRITE US.

Page & Hill Co., *1003 LUMBER EXCHANGE, MINNEAPOLIS, MINN.*

BUY YOUR POLES

When you want satisfaction without worry and trouble

OF

The Fowler Companies

Fowler-Jacobs Co. **Elmore-Fowler-Jacobs Co.** **John H. Fowler & Co.**

FISHER BUILDING, CHICAGO, ILL.

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POLE STEPS

PLAIN AND GALVANIZED

9-16 X 9, 5-8 X 9, 5-8 X 10 INCH
Other Sizes Made to Order

We make our own steel and do our own galvanizing, therefore lowest possible prices and quick shipment.

INLAND STEEL COMPANY, First National Bank Building CHICAGO

RIGHT IS MIGHT!

OUR POLES ARE RIGHT

We know as much about Telephone Poles as anyone can. We know how to give prompt attention to your business and to secure prompt deliveries by railroad.

A letter from you asking prices or other information will have the same prompt and courteous consideration that we would give an order for 100 carloads of poles.

WRITE TO-DAY

SAND POINT CEDAR CO., SAND POINT, IDAHO.

The Valentine-Clark Co.

Beg to announce to users of . . .

CEDAR POLES

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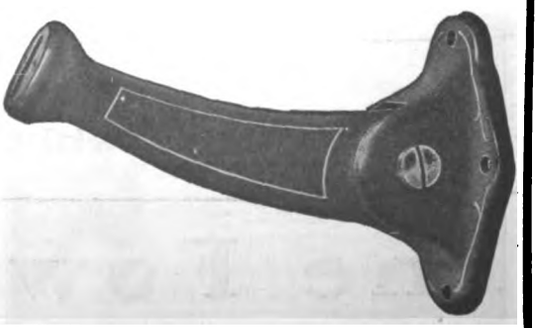

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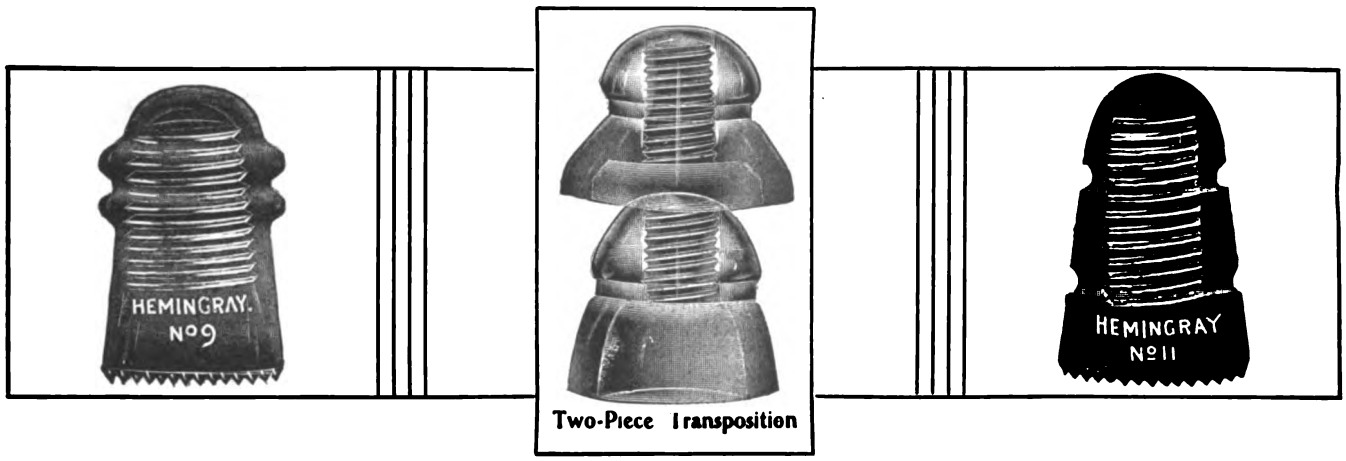

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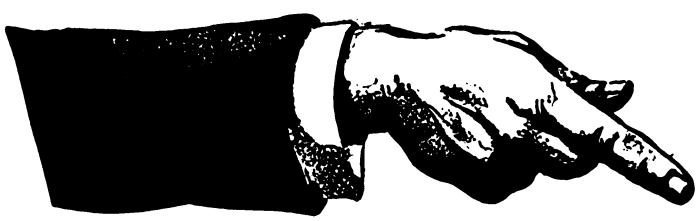

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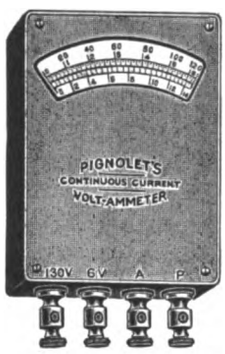

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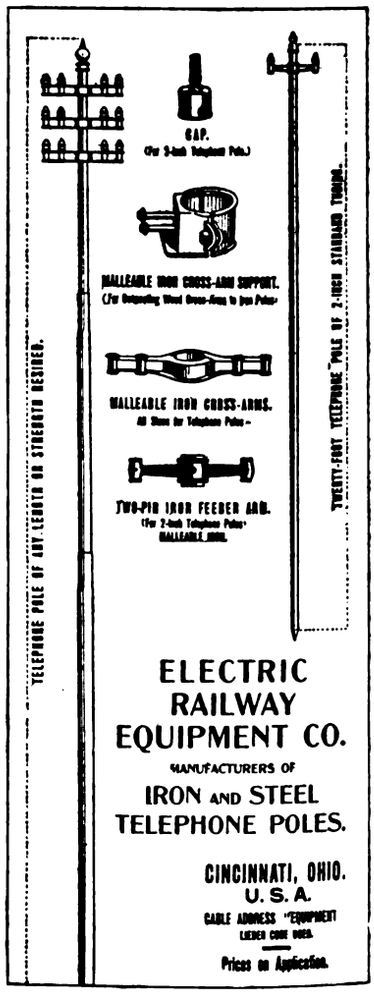

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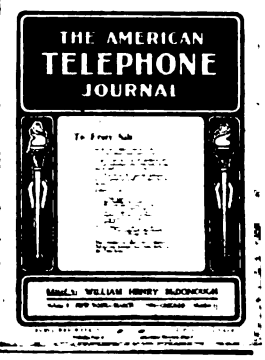

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- Barr, W. J., Mfg. Co., Cleveland, Ohio.

WIRE.
- American Electric Tel. Co., Chicago, Ill.
- Bissell Co., The F., Toledo, O.
- Chicago Insulated Wire Co., Chicago, Ill.
- Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
- Kellogg Switchboard & Supply Co., Chicago, Ill.
- Nagel, W. G., Electric Co., Toledo, O.
- National Wire Corporation, New Haven, Conn.
- Okonite Co., New York.
- Roebling's Sons Co., John A., Trenton, N. J.
- Scovill Mfg. Co., Chicago, Ill.
- Spargo, James A., Wire Co., Rome, N. Y.
- Standard Underground Cable Co., Pittsburg, Pa.

WOOD PRESERVER.
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A conduit of endless durability. A continuous sealed insulating duct from manhole to manhole, impervious to gas and moisture and ***Electrolysis Proof.***

A duct that is and remains ***Perfectly Aligned,*** into which and out of which cables can be drawn with ease and rapidity without the possibility of a scratch.

Saves sixty per cent of freight and handling costs, and twenty to thirty-five per cent of construction cost. All diameters one to ten inches, seven foot lengths.

Bends of All Angles **Prompt Deliveries**

Send for Illustrated Booklet ***Ask for Prices, Giving Size and Quantities Required***

AMERICAN CONDUIT COMPANY

336 Macy Street, LOS ANGELES, CAL. **7th Floor, 170 Broadway, New York** Manhattan Building, CHICAGO, ILL.

STANDARD Vitrified Conduit Co.

B. S. BARNARD, Manager.

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Underground Clay Conduits.

High Grade Material.

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We are Supplying the Largest Contract in the Trade.

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Special Connectors for Hard-Drawn Copper Wire

Fused Wire, Fused Links and Strips.

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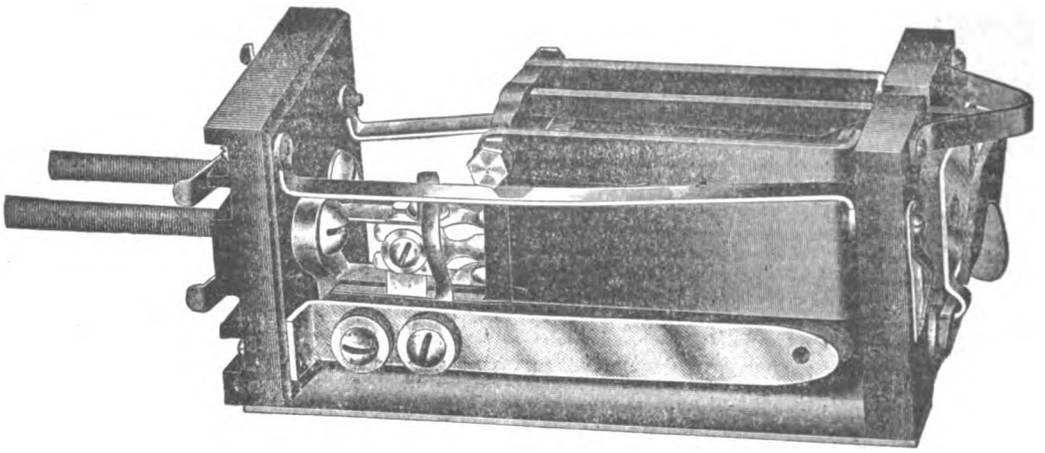
IMPROVED AMERICAN EXPRESS SWITCHBOARDS

BETTER THAN EVER



Manufactured under Patent Nos.

617,691
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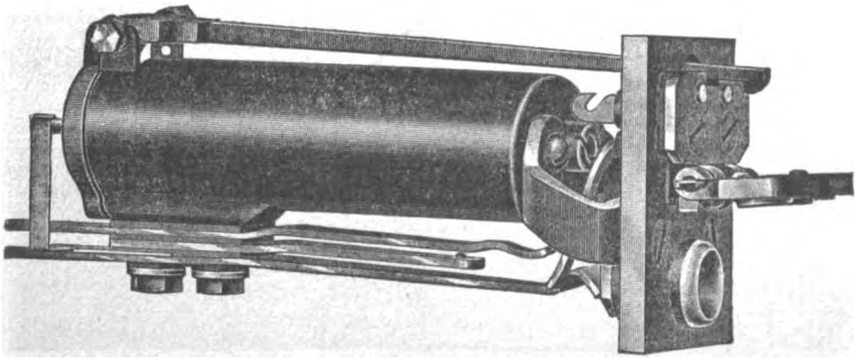
SELF-CONTAINED DROPS AND JACKS
RAPID RINGING DEVICE

All drops restored to normal position by withdrawal of plugs.

SEE ALSO OUR

BELL-EXPRESS SWITCHBOARDS

Which are built with self-restoring drops and jacks in banks of 5 and 10.



AT POPULAR PRICES

AMERICAN ELECTRIC TELEPHONE COMPANY

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THE AMERICAN TELEPHONE JOURNAL

There are other Things

besides technical and descriptive articles that must have space in a trade paper. These are important, but it must print the news of its particular industry.

Above all it must be steadfastly loyal to the interests it represents.

Dr. Henry S. Herr, one of the best known Independent operators in Iowa and president of the Iowa Telephone Association, in a recent letter to the Editor of this paper said :

> "If anyone ever doubted that you are working in the interest of the Independent Telephone business they would certainly be convinced of your loyalty by the activity displayed in exposing the Evansville (Ind.) telephone situation."

This article published on March 19, 1904, can be mentioned as one instance of the enterprise and loyalty of this paper. Every issue contains equally interesting and valuable articles.

Edited by WILLIAM HENRY McDONOUGH

Volume 10 NEW YORK—JULY 30, 1904—CHICAGO Number 5

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Advertisers' Directory, Page 9

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The AMERICAN TELEPHONE JOURNAL

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CONTENTS.

COST AND COMPENSATION.....By C. H. JUDSON
CONSTRUCTION AND OPERATION OF EXCHANGE CIRCUITS.....By E. FRANCIS PARKER
THE USE OF THE PEG-COUNT IN CENTRAL OFFICE OPERATION.....By A. DALLAN O'BRIEN, ARTICLE III
CHURCH SERVICE BY TELEPHONE.....THE ROCKY MOUNTAIN BELL'S LATEST EFFUSION

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THE WEEK'S MESSAGES — TRADE NOTES
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Brass Rod, Wire and Tubing

SPECIAL SPRING GERMAN SILVER FOR TELEPHONE WORK

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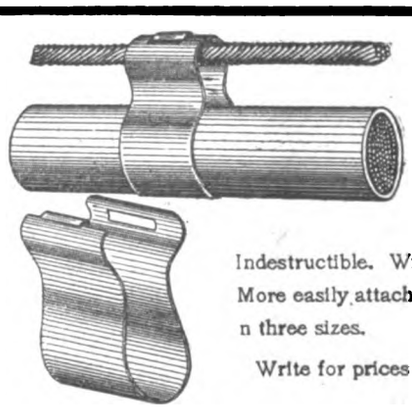

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I want to Lease a Telephone Plant in a live prosperous city.

One that is not earning up to expectations. Can make it pay good interest to owners.

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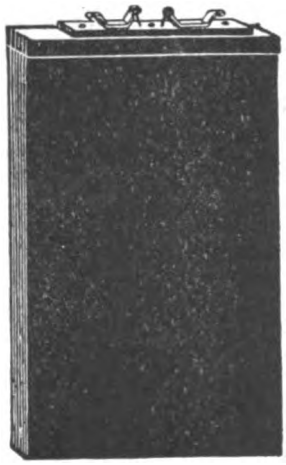

On your Bridging Telephone Lines by the use of our

Special X-P Type Condensers

WE WILL GLADLY TELL YOU ABOUT THEM IF YOU WRITE

AND THE PRICE IS LOW.

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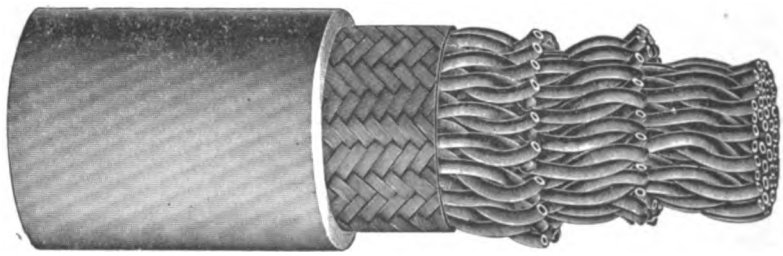
Manufacturers of

"Paranite"

RUBBER COVERED TELEPHONE WIRES AND CABLES :: :: ::



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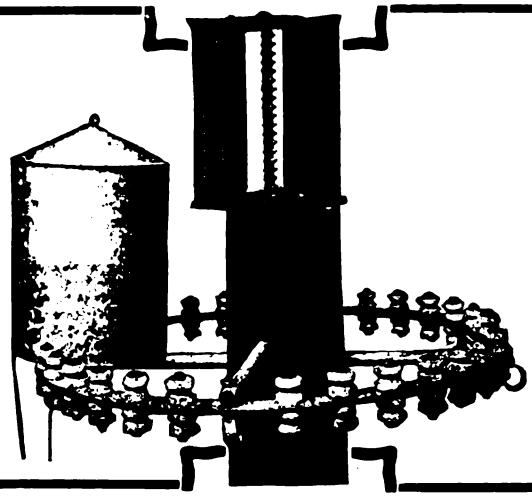

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WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***

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Sole Manufacturers,

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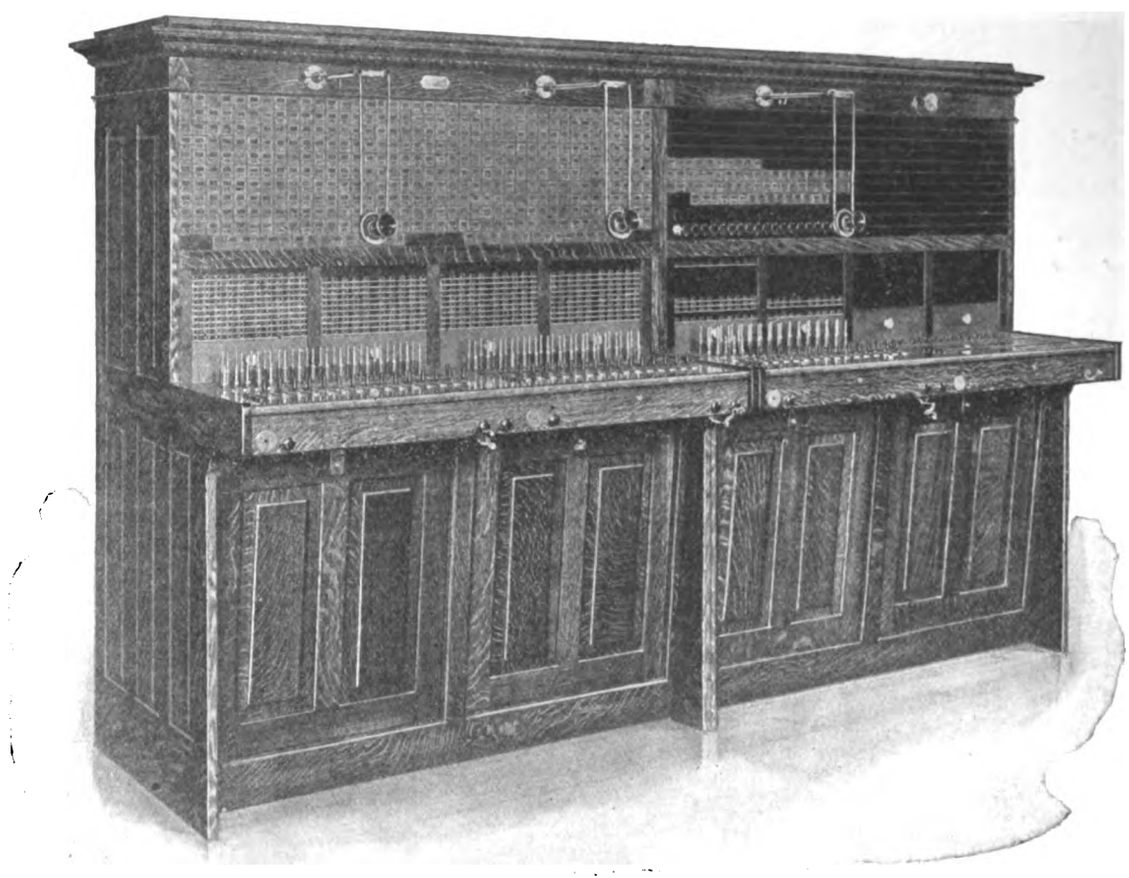
Stromberg-Carlson

That name on your switchboard guarantees

Perfect Telephone Service



Two Sections of Cabinet No. A-1522

The first and second position are each equipped with 200 Generator-Call Visual Line Signals. Third position 65 Generator-Call Visual Signals and 20 tubular drop lines. The fourth position is left blank.

It will pay you to write for printed matter describing these boards. We mail it free.

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is so simple in construction as to make trouble almost an impossibility. The switch is mounted in the base and is directly actuated by the hook. The arrangement of the springs is exactly the same as in the switch-hook used in Monarch wall telephones. No electrical connections are made with the stand. All connections are brought to a rubber block in the base :: :: :: ::

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Monarch Telephone Mfg. Co.

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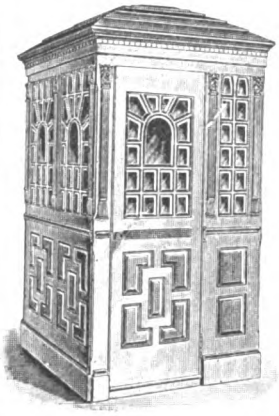


Telephone Booths

Handsome in Design
Attractive in Price

Write us for special proposition we have for readers of this Journal who are not already our customers.

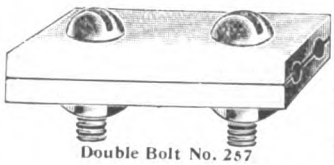
W. S. Seaman & Co.

216 WATER STREET
MILWAUKEE, WISCONSIN

Harvard Wire Connectors

PRICES:

Less than 100 - - each $0.09



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Lower prices in larger quantities. Get a sample and see for yourself that it is better and cheaper than the one you are now using.

Descriptive circular if you want it.

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"INTERNATIONAL" PATENT TELEPHONES SWITCHBOARDS

For any size public exchange. Their quality sells our goods

Write for prices and samples

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LINEMEN TOOLS, BATTERIES, WIRE, BRACKETS, PINS, CROSS-ARMS, BRACES, LAG BOLTS.

Quick Shipments. Prices are Right.

HIGH GRADE TELEPHONES AND SWITCHBOARDS.

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TELEPHONES SOLD BY FARR CHICAGO. THAT TALK FAR RING FAR.

Exchange Telephones

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A set of Bookkeeping Blanks and Ledgers Free with a $10.00 Order.

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SELLING Is Not the Most Important Thing With US

¶We believe prompt attention to a complaint is better business than a new sale. **ANDRAE Telephones and Switchboards** leave the factory *ready for hard work and lots of it.* But things *will* happen. For instance, an operator wrote: "My telephone will not work." It was 425 miles away and the order was small. But our expert went by the next train. And he found—the ground rods had not been put in deep enough. ∴ ∴ ¶It was needless and expensive trouble for us, but that operator is now our friend for life. He knows that **ANDRAE Telephones and Switchboards** have behind them **A Guarantee that Means Something.** ∴ ∴ ∴ ∴ ∴

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Marline Cable Hangers

Made to fit any size cable.

We have samples of Marline, cut down after 9, 10 and 13 years' service in Chicago, the worst possible exposure, and which show on the outside the effect of the weather, but which inside are bright and strong, and good for many more years. The hooks were rotten but the Marline was practically untouched.

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Manufacturers and Jobbers of
TELEPHONE SUPPLIES
226-228-230 HURON STREET
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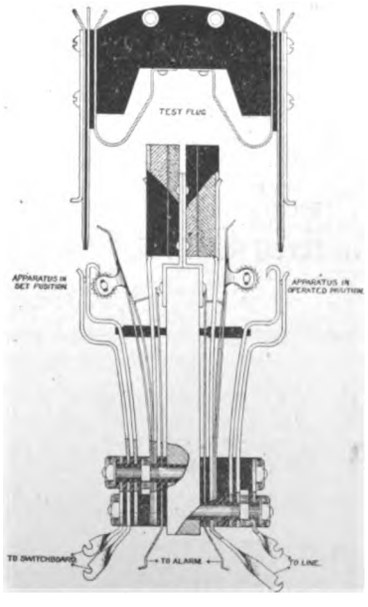
COOK'S NEW PROTECTOR
No. 444
IS A LONG STEP IN ADVANCE



Equipped with **Self-Soldering Heat Coil.**
Better than anything else on the market in every way—including price.
Costs Nothing to maintain.
A sample and some more information upon request.

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Multiple Extension Sets

and Local Intercommunication by the

NESS SYSTEM

By installing our Intercommunicating System in connection with your Exchange Line you greatly increase your revenue without adding to your line investment or crowding the capacity of your switchboard.

Bulletins Nos. 148 and 149 tell how this can be done properly and contain wiring diagrams.

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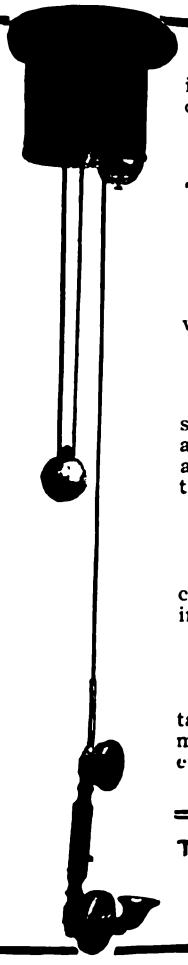

You could lie on your back on the floor, if that ungraceful attitude were customary or necessary, and use

The Pendent Telephone

with perfect ease.

This rather awkward illustration is used simply to demonstrate that the Automatic adjustability of its ***Receiver-Transmitter*** adapts it to any height, angle or distance in the ordinary room.

Central is signalled for connection or disconnection by the mere movement of the instrument for use or disuse.

There are twenty-four exclusive advantages claimed for ***The Pendent,*** to date, and more to be heard of. We shall be pleased to enumerate them on request.

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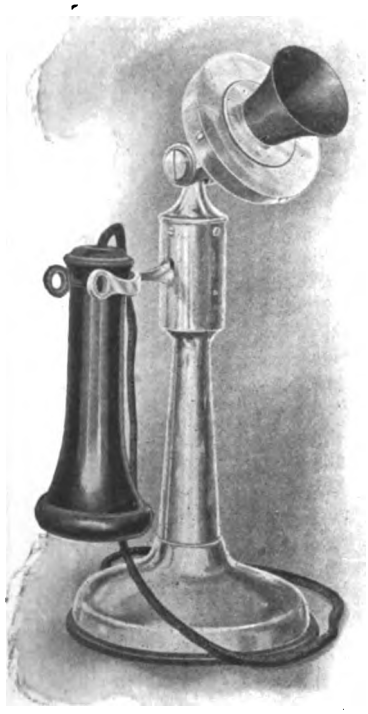
La Crosse, Wis.

REASONS.



1. Our Company is officered and owned by Pioneers in the Telephone Business.

2. They are **Operators** of exchanges aggregating over 35,000 subscribers.

3. They **Operate** over 3,000 miles of Toll lines.

4. They are posted on the wearing qualities of the various makes of Telephones and know their weak points.

5. These weak points do not exist in "Eastern" Telephones.

6. Who can be better qualified to judge of good apparatus than **Operators of the Largest Independent Systems in the United States.**

7. If built for their use with the weak points eliminated, are they not good for your use.

8. Send us a Sample order for trial. Return Telephones if unsatisfactory.

Eastern Telephone Mfg. Co.

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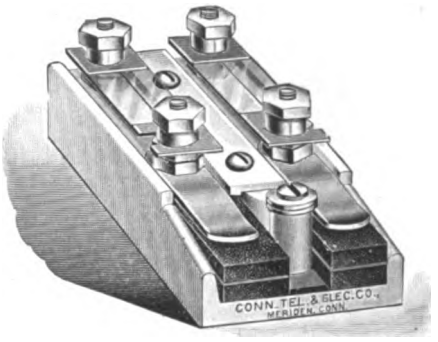

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Combined Lightning and Sneak Current

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Sample Post Paid, 20 Cents.

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CONN. TELEPHONE & ELEC. CO.

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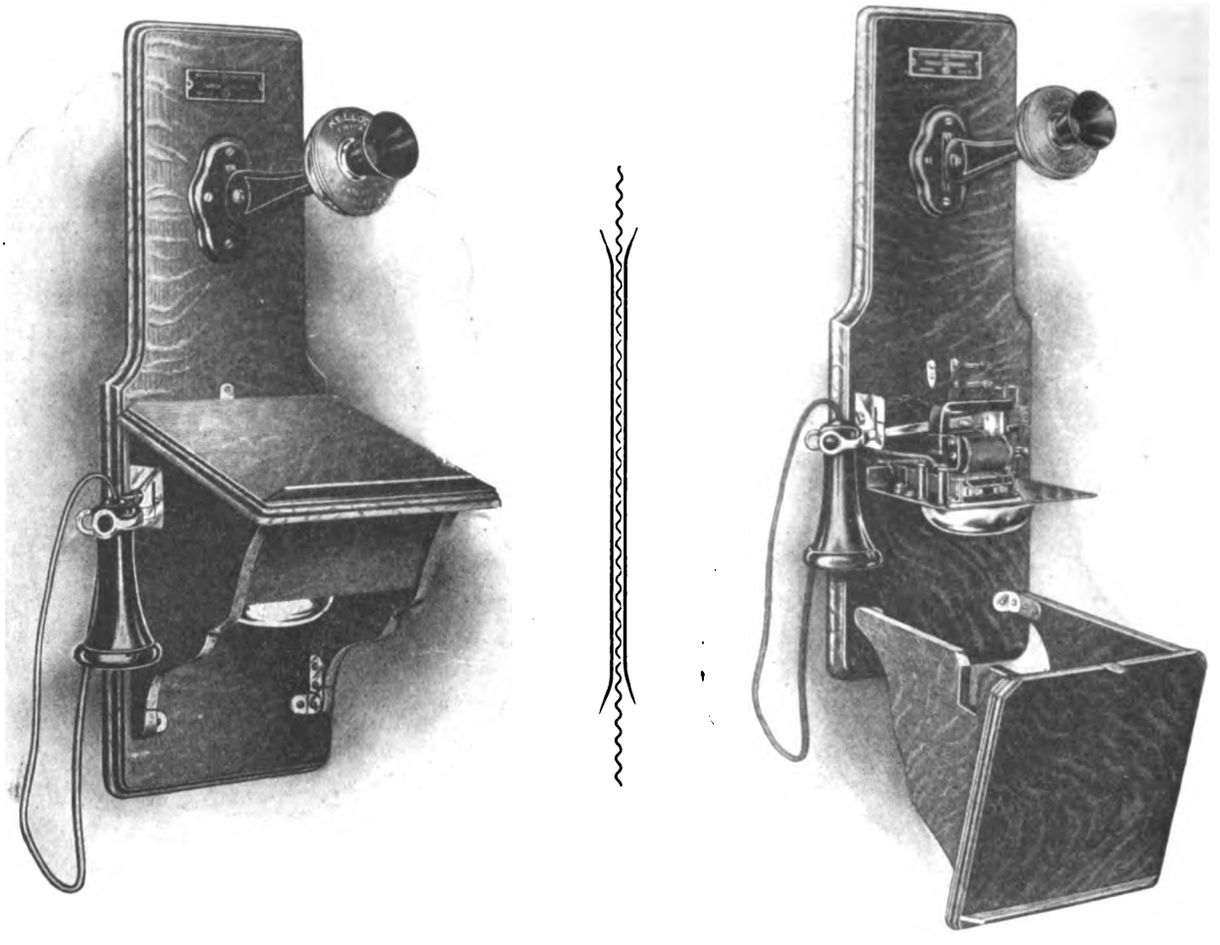
Kellogg Four-Party Line Telephone



A SELECTIVE Telephone that selects, and absolutely the only system that has ever succeeded in accomplishing this without aid of ground connections.

This Telephone rings for the desired party alone, and does not ring in any way for any other party on the line.

It Rings with Alternating Current.
It Rings Loud.

It Rings with Distinctive Tone.
It is Used in Our Largest Exchanges.

Kellogg Switchboard & Supply Co.,

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LOS ANGELES.

Electric Building,
CLEVELAND.

Keystone Telephone Building,
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W. D. CABLE COMPOUND

This compound has all the essential properties of a perfect insulating compound. **High Melting Point. Perfect Insulation.**

Packed, 8 lbs. to pail

SECURE OUR PRICES ON TELEPHONE CABLE

The W. G. NAGEL ELECTRIC CO., Toledo, O.

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		Valentine Clark Co.	30

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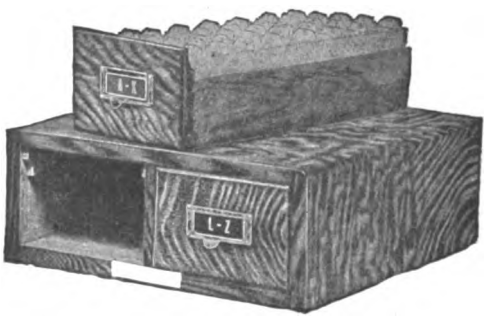
Attorney and Counsellor at Law
305-309 Broadway NEW YORK CITY
Patents—Telephone Work Especially



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- Cash Books
- Trouble Tickets
- Rental Receipts
- Voucher Checks
- Exchange Directories
- Fine Stationery

Special Forms of All Kinds

Write for Sample Forms and Prices.

THE TELEPHONE PRINTING CO.,
DEFIANCE, OHIO.

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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW
MINIMUM DEPOSIT IN BOTTOM OF CELLS
EXTREMELY LOW INTERNAL RESISTANCE

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UNIQUE FEATURES
IN
BAIRD NEW MODEL
PAY-STATIONS

A powerful lever with one man power behind it insures positive operation.

The Piano-Wire Springs of finest quality give reliable action.

Our combination lock gives great security.

A constantly increasing list of **satisfied** customers register their approval of Baird apparatus by sending in repeat orders.

Write for catalogue or any desired information.

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No. 156 FLUSH PHONE
JUST RIGHT FOR RESIDENCE SYSTEMS

Different Woods

Assortment of Gongs

Fitted with the best button made "The Workrite"

System B 2

Get a sample button.

10 2c. Stamps brings it prepaid

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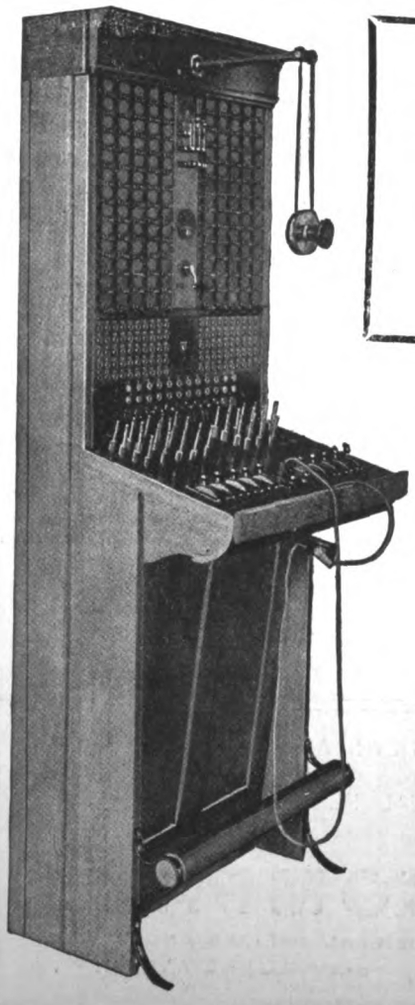

SWITCHBOARDS
TELEPHONES
PROTECTORS

If You Don't See What You Want, Ask For It

WE MAKE IT

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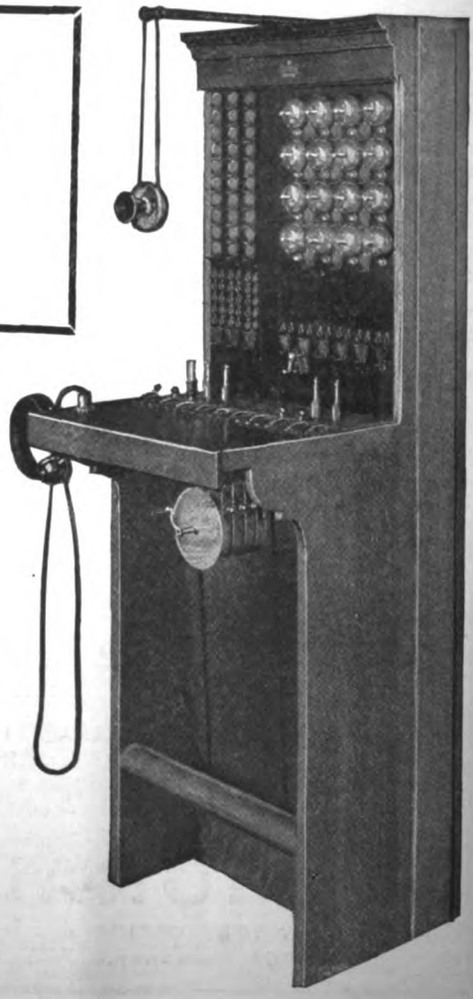

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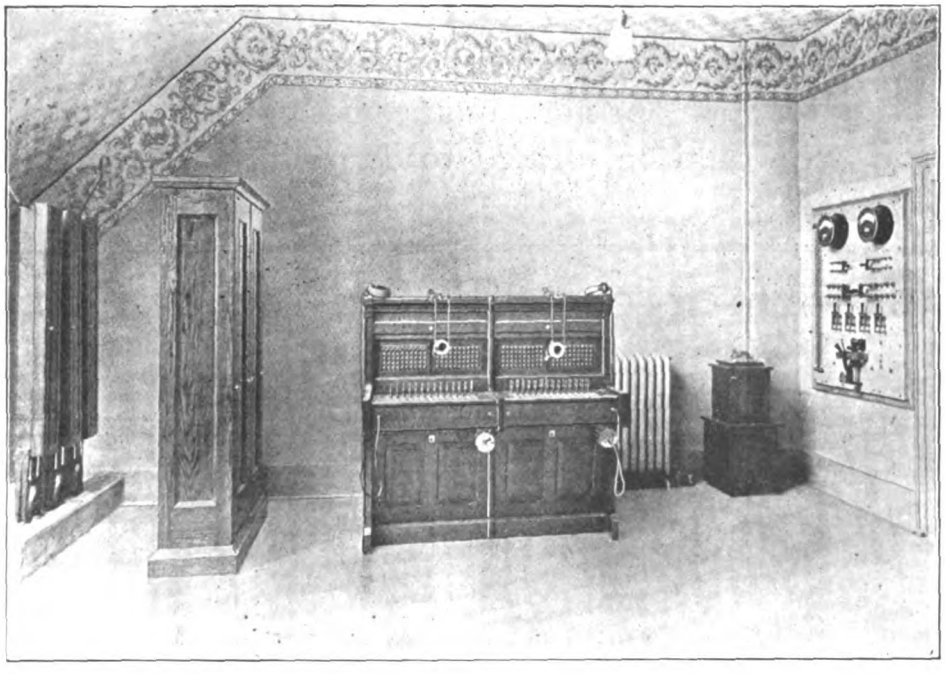

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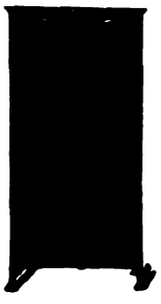

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CHURCH SERVICE BY TELEPHONE

PHILADELPHIA has recently contributed several ideas of novelty and value in the telephone field. In a late issue of our magazine we called attention to the news bureau installed by the *Evening Telegraph* of that city, by which the anxious householder can have queries answered almost immediately, upon any subject from how to run the kitchen range to the distance of the nearest star. Several weeks ago, Dr. Russell Conwell, the well-known pastor of the Baptist Temple, initiated a step in the telephone field which will probably lead to far-reaching and lasting developments.

The illness of a favorite daughter, in one of the Philadelphia hospitals, was the immediate cause of the new idea. Dr. Conwell's daughter had always been accustomed to linger lovingly over her father's sermons, and had many times helped him with his dictation. One may, therefore, imagine that she greatly missed the Sunday sermons of her parent. At this point a brilliant idea came to the pastor. Telephones had been used for the transmission of almost every conceivable idea. Why, then, should they not be used to transmit a sermon or a hymn to hearers at a distance? A temporary megaphone was accordingly rigged up in the pastor's temple and equipped with a telephone connection. Reclining in her bed, the next Sunday, in the hospital, his daughter was enabled to follow carefully the entire course of her father's preaching and even to join in many of her favorite hymns.

Preaching by Telephone to Hospital Patients.

The monotony of hospital life was so greatly relieved by this innovation that Dr. Conwell determined to carry out the idea on a larger scale for the benefit of others besides his family.

The Samaritan Hospital on North Broad street, of which Dr. Conwell is president, received the new idea with much pleasure and arrangements were quickly made to place telephones in all the wards of the hospital on the following Sunday. For the successful carrying out of this experiment a string of six of these megaphones was hung in front of the platform at Dr. Conwell's church. The Baptist Temple, it may be remarked, is one of the largest church edifices in Philadelphia, and is remarkably well adapted for the transmission of sound, so that the characteristics of the megaphone were admirably helped by the nature of the building itself.

Clearly and sweetly the next Sunday the words of the old hymn, "How Firm a Foundation Ye Saints of the Lord" came to the patients in the Samaritan Hospital. By the receivers placed in the hospital ward, the singing of the splendid chorus and likewise the words of the sermon were heard distinctly by the patients. For those too weak to hold the receiver to the ear, head attachments were provided, so that they could follow attentively the entire sermon and hymn singing. The voice of the preacher came out strongly and clearly, each word being caught by the megaphones and carried to the delighted patients in the hospital. So realistically close was the singing to the accompaniment of the great organ in the Temple, that many patients joined in the chant. One after another, favorite hymns came over the telephone lines and were listened to devoutly by those in the wards. The illustrations, which show clearly the adaptation of the telephone to such a unique condition, are taken from the *Christian Herald* and the New York *Tribune.* Hereafter telephonic communication to the hospital will be a regular feature of Dr. Conwell's services.

The matter has also been put before the trustees of other hospitals, and it is expected that before long most of the large sanitariums in Philadelphia will be in connection every Sunday with the sermons of Dr. Conwell and the hymn singing of his congregation. This startling innovation has favorably commended itself to a number of the Philadelphia clergymen, although many of them are loth to express themselves on the subject, preferring to await its further development before determining finally whether or not the innovation will be

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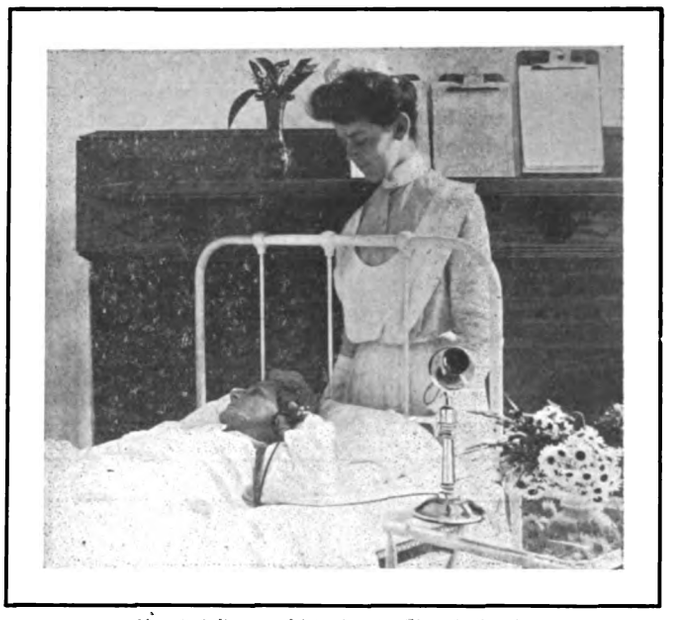
generally feasible. A similar arrangement, however, is under consideration by the Rev. Neil, pastor of the Second Baptist Church, on North Seventh street, Philadelphia, to connect with the Old Ladies' Home, which is maintained by this church.

Strange to say, it appears that in far off Texas, an idea very similar to Dr. Conwell's was put into practice at almost the same time that the Philadelphia pastor connected his church with the Samaritan Hospital. By the courtesy of the Citizens' Telephone Company of Paris, in that State, a service was established into the homes of the members of the First Cumberland Presbyterian Church from the church building. Members of the congregation, who are patrons of the telephone company, can now listen to the services and hear the sermons at home without having to go to church. Manager Dunaway has recently installed this service, and after a thorough test it has been found to work extremely satisfactorily. It marks, in fact, a still further step in the direction taken by the Philadelphia pastor.



Hospital Patient Listening to Church Service.

One might almost fancy that if the idea should be extended much farther, the entire necessity for a church building would be obviated and that the congregation could follow their rector, and even join in chorus singing in the privacy of their homes while the pastor sat talking into a large megaphone, in the retirement of his study. If such an idea were fully extended there would be the additional benefit that one could, without any trouble, select their favorite preacher, or change from one sermon to another.

Mr. Dunaway claims that when living in Pittsburg, some years ago, the idea of providing a sermon for the benefit of stay-at-homes first occurred to him. He further states that at that time he once connected a hospital with one of the clergymen of the city in a manner practically similar to that by which Dr. Conwell has recently gained so much attention.

The new departure of Dr. Conwell's calls to mind the extension which has been made in the last year or two of telephone usage in the more out-of-the-way places and conditions. For example, many of the best equipped trains have now telephonic connection between the conductor and the engineer. Also the traveling man, in many instances, finds himself able to talk to business houses at stations where a temporary stop is made, without dismounting from the train and running the risk of missing his connections. Passengers may talk to friends, or customers to clients, without alighting from the car. This idea was first successfully tried as an experiment on a Western road and was fully carried out during a recent trip of some prominent officials of the Pennsylvania Railroad. It now promises to come into general use on many of the railroads of the country. Many commercial travelers have a few connections in the smaller towns. To call on each of them would involve delays comprising several days, with a possibility of no business being done. Now, on the railroads spoken of, all that the salesman has to do is to call up on the telephone his more obscure and doubtful customers and briefly put his proposition before them. He then knows whether they wish to see him or not.

Again, in this country of long journeys and frequent absences, it often happens that a business man remembers, at the last moment, that matters of importance have been carelessly overlooked which must be attended to before his return. Under conditions as they have existed, this meant a long interval of anxiety before the trains would stop where the remedy could be effected by means of the telegraph. Now, on those railroads which have installed the new apparatus on their trains, the busy traveler can communicate directly with his office from the car, at the first stopping place.

In another direction, the telephone has proved to be of great benefit to the trainmen themselves. The frequent nuisances of friends bidding farewells, and tearing themselves away at the last moment, to the great danger of their limbs and to the anxiety of the trainmen will be shortly entirely obviated. Instead of beseeching appeals to acquaintances and relatives to make haste, the trainmen will now merely sever the wire connection and the traveler will be obliged to stop talking.

CONSTRUCTION AND OPERATION OF EXCHANGE CIRCUITS

By E. Francis Parker.

ARTICLE I.

ONE of the most important things to be learned by a man who is clearing switchboard trouble is the general outline of the various circuits, the relation of the different pieces of apparatus to one another and methods of wiring by means of cables. In the following article it is the purpose of the writer to describe some of the circuits he has worked on, illustrating the connections from the entrance of the cable to the exchange building through the various appliances up to and including the switchboard. Referring to Fig. 1, it will be seen that the circuits enter the building in underground cables, which go to the inside springs of the protective devices mounted on the vertical side of the main distributing frame (*M D f*). From there they pass through the heat coils to the outside springs, which connect by means of cross connecting or jumper wires to the horizontal side of the main distributing frame. It is important to note here that each color of the jumper wire is always used to make the same connection—that is, one color is used to connect the line side of the protective device to the line connection of the lug on the horizontal side, and the other color performs the same function for the test side. This rule never varies, otherwise the confusion that would arise from indiscriminate connections of the red and black components of the connecting wire would cause a tremendous amount of delay in tracing circuits, which is impractical.

The two lugs which are the terminals on the horizontal side of the main distributing frame (*M D F*). From there they pass tion. These contacts are used when a change is made from one

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line to another, so that the telephone circuit may not be broken to the switchboard while the transfer is being made. The method employed is called making a half-tap, and is as follows: Supposing it is desired to change the underground conductors of a circuit, which we will call No. 21 pair to No. 36 pair. The old jumper wire is disconnected from its present lugs and connected to the two other lugs. Then the new jumper wire is run from the underground pair 36 to the lugs that were formerly occupied by the old jumper wire, and when the connection is completed the old wire is cut off and pulled out of the frame. It is very important that all old jumper wires should be taken out, otherwise when the frame man is called upon to assign a new pair, and he finds cross connecting lines connected to it, a large amount of delay will be caused in tracing.

From the lower side of the terminals the wires run off in twenty-one pair cables to the lower lugs of the terminals on the horizontal side of the intermediate frame. Besides the two terminals used for these connections, there is an additional one, the object of which will be apparent later. A triple conductor cable is tapped on to these three terminals and goes to the multiple jacks. To the upper lugs is connected a triple conductor jumper, which connects to the upper lugs of the terminals on the vertical side. It will be noticed, tracing the various connections, that the test side of the circuit, which is the red wire of the twisted cross-connecting pair, at the main distributing frame connects with the white component of a pair in the twenty-one-pair cable, which in turn connects with the white conductor of the triple jumper wire of the intermediate frame, and that the black wire of the main frame jumper connects with the colored wire of the pair in the cable to the intermediate frame. This connects with the black conductor of the jumper which goes to the vertical side.

Attention is called to the position of the lugs upon the intermediate frame. The white wires connect with the inside lugs, the black wires with the next lugs, and the red wires with the front terminals on the horizontal side, and the second terminals from the front on the vertical side. The additional terminal on the vertical side is known as the lamp contact, and is used to connect the lamp associated with the line in the answering position to the line relay.

The third connection, as it is generally termed, which is made by means of the red wire, connects the sleeves of the multiple and answering jacks, through the red wire of the cable to the relay rack, with the winding of the cut-off relay.

It will be seen that the vertical terminals on the intermediate side have connections for two separate cables. One of these runs to the answering jack panels and the other to the relay rack. In both instances they are quadrupled conductor cables, of which the white and the colored wires form the talking circuit, the red wire the circuit for the third connection, and the fourth conductor goes to the contact of the line relay, the armature being grounded on the frame; a tap is taken off the lamp wire to a 300-ohm resistance coil connecting with a strap that connects with a lead to the pilot lamp, the other side of which connects with a battery strap. The red wire connects with one end of the winding of the cut-off relay, the other end of which is grounded.

The operation of the circuit is as follows: When a subscriber takes his receiver off the hook a shunt is thrown across his line, which completes a circuit from the grounded spring of the cut-off relay out over the line through his instrument back through the other spring of the cut-off relay, which connects with the winding of the line relay, and thence to battery. This causes the line relay to be energized, closing its armature with the line lamp contact, and thus forming a circuit from the battery side of the line lamp through the relay contact armature to ground, and also a shunt path is formed through the 300-ohm resistance coil and the pilot lamp to battery, lighting both line and pilot lamps.

a combination of red and color. It might be well to state here what is meant by color. It is necessary to distinguish by some means the separate wires of a cable, and for this reason a color scheme has been devised which in general use is as follows:

1—Blue.	11—Orange and white.
2—Orange.	12—Orange and green.
3—Green.	13—Orange and brown.
4—Brown.	14—Orange and slate.
5—Slate.	15—Green and white.
6—Blue and white.	16—Green and brown.
7—Blue and orange.	17—Green and slate.
8—Blue and green.	18—Brown and white.
9—Blue and brown.	19—Brown and slate.
10—Blue and slate.	20—Slate and white.
	21—Red and white.

The 21st wire is a spare and is only used in case one of the others is bad.

The lamp wire circuit is made up of the same color that is used in the talking circuit, and a red thread is added. In this way, supposing jack 18 has brown and white for its line color, then the lamp wire would be brown, red and white. At the relay rack the colored wire connects with the spring of the cut-off relay, which is normally grounded on the frame. The white wire takes the other spring, which connects with the winding of the line relay, which in turn connects with a battery strap. The lamp wire

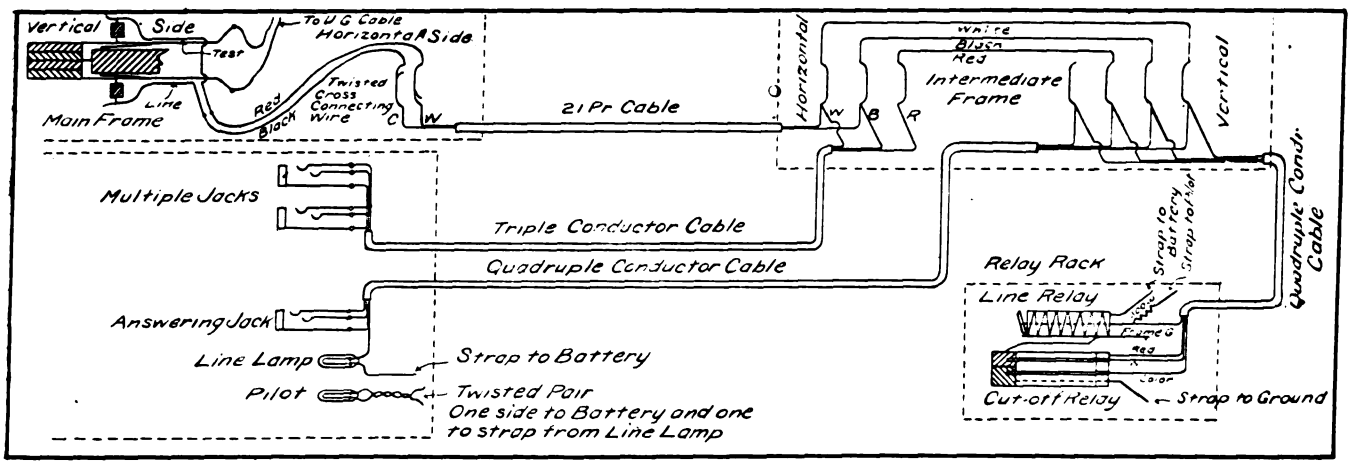

Fig. 1. Showing Arrangement of Cables and Cross Connecting Frames.

INDEPENDENT COMPANY FOR MILWAUKEE.

THE Independent Consolidated Telephone Company, which has made considerable progress in Wisconsin in the last few years, is preparing to enter Milwaukee. The company is selling stock with a view to extending its system from Jefferson to Milwaukee. The line will be built to the city limits and then the first steps will be taken to get a franchise.

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COST AND COMPENSATION.

By C. H. Judson.

THE probem of rates has been an extremely vexing one to Independent telephone men, and the inability of the inexperienced promoter to fix a rate which shall be low enough to be attractive and at the same time profitable, has in the past resulted in much disappointment and grief for the ambitious manager, and in many instances in unjust criticism of his economic system. With the Bell it was "all the traffic would stand," but with the competing manager the case is very different.

There is a low-water mark in the expense account below which are the shallows, reefs and sand bars of poor service, destructive decay and bad collections, and no manager, be he ever so brilliant, can steer his craft to the harbor of prosperity unless he has below his keel sufficient depth to float his craft with its full investment cargo. A knowledge of this mark is absolutely necessary before the boat is loaded or disaster is bound to result. Many country operators have been led into the too-low-rate error by telephone and supply salesmen who, knowing nothing of the business, have unhesitatingly advised ridiculously low rates in order to encourage the prospective purchaser to buy his goods. I believe, however, that this type of salesman is almost extinct, and it is now the policy of all reputable manufacturing houses to render as much accurate information as possible along these lines.

	A	B	C	D	E	F	G	H
	Above							
Approximate number of telephones	6,000	4,500	3,000	2,000	2,200	800	800	400
Party lines	No	No	No	Yes	No	No	Yes	No
General expense	$5.11	$4.31	$3.89	$3.73	$3.58	$3.20	$3.00	$3.05
Maintenance "	4.91	4.52	4.22	3.77	3.80	2.85	2.28	2.50
Traffic "	4.63	4.65	4.57	4.41	4.67	4.40	4.52	3.90
Taxes	.80	.88	.73	.65	.80	1.08	.81	.25
Total	$15.45	$14.36	$13.41	$12.56	$12.85	$12.53	$10.61	$10.70

G and H companies are the only ones paying rent. The other six own their own buildings.

Cost of Operation.—Table Showing Averages per Telephone per Annum in Eight Exchanges.

Experience has shown that the average community suffering from Bell abuses has not demanded extravagant reductions of rates as the sole form of relief but that it is loyal to the local company that gives good service even where rates have been but slightly reduced. Witness the hundreds of instances where the Bell rates have been cut far below the local company's rates in a frantic effort to retain the business. If there can be no reduction of rates without making them unprofitable there should be some other very good reason for the establishment of the competing system.

Now to get at the meat in the cocoanut. How is the inexperienced operator going to know what is a profitable rate? The factors of cost are:

1. Traffic.—Operators' salaries usually compose this item. In large exchanges a division of heat, light, water, rent and power is frequently made and a portion charged to traffic, but in smaller plants such a separation is hardly required.

2. Maintenance.—The cost of keeping the plant in good repair. This head will not include replacement of worn-out lines or apparatus (depreciation taking care of that), but the repair of all ordinary wear and tear, the cost of rearranging line circuits, if necessary to meet varying conditions, even to the resetting of poles and relocating of subways if such becomes necessary. Also the cost of moving instruments where no charge is made for this service. Some companies also charge all instrument wiring on new work to this account.

3. General expense, which may be again divided if desired and which includes all office expense, insurance, rent, light, heat, water, power, advertising, directories, janitor service, traveling and whatever is not specifically included under other heads. Of course the distribution of items is largely arbitrary.

4. Taxes. 5. Depreciation.

6. Interest on bonds and dividends which may be guaranteed.

The plant must earn enough to pay the preceding charges and leave a surplus sufficiently great to apply as dividends on the stock. It is a wise manager who in addition to the above will also desire to lay aside a fund to replace property destroyed by extraordinary causes, such as tornadoes, floods, fires, etc. The annual charges can be at least approximated, but the emergency requirements are wholly beyond calculation. The acts of Providence being without the pale of human calculation, it is wise to make a liberal provision for the emergency fund, knowing that if the extraordinary damage does not occur the undivided surplus is always available.

The item of depreciation is one which has been greatly exploited by Bell minions who wish to discourage investment in Independent enterprises. They say that their companies have always provided a large margin for depreciation, but unfortunately for the truth this item seldom appears on the records of the Bell companies when they are opened for inspection. The fact remains that the item is an important one and cannot be overlooked. It has been the subject of a resolution in at least one association meeting, which fixed a rate of depreciation to be charged off by the members on their plants.

While the moral effect of such a resolution is good the utter impossibility of fixing a flat rate of depreciation to apply to all plants within a given territory, regardless of the quality of construction and equipment, is readily apparent. I do not wish to fix a rate, but I have found that on high-grade work the opinions of a large number of experienced operators, both Independent and Bell, will average about as follows:

Clay conduit	2%
Underground cable	5%
Aerial cable	7%
Copper wire	2%
Iron wire	10%
Poles and cross arms	8%
Telephones and switchboards	10%

So that by separating the various items of construction it will be a comparatively easy matter to arrive at a figure for the item of depreciation, keeping constantly in mind that wood decays and iron rusts at varying rates under different conditions.

The accompanying table has been compiled from the actual accounts of eight telephone companies now in business, and is an excellent exhibit of the averages of the items mentioned, the different exchanges being designated by the letters from A to H. In each of the cases mentioned the best of service is being given with the best of equipment, and lines and apparatus are being properly cared for. They are in widely separated sections of the country, so that there may be slight differences in wages and

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cost of materials. I have been unable to secure figures at all reliable from any exchange operating less than 400 telephones, but from such data as I have I believe that a reduction of from ten to fifteen per cent. below the figures given for H might be made. The difficulty in getting accurate figures on very small exchanges is due to lack of bookkeeping, most of the accounts of such being mixed with the accounts of other business enterprises belonging to the owners.

It will be noted that some of the exchanges are using party lines and some are not, also that there is considerable variation in some of the figures. This may be due to different methods of separating accounts or to different methods of management. I shall have occasion to use this table with additions covering depreciation, income and interest charges in a later paper in order to show the earning power of a modern exchange.

In each of the exchanges used as illustrations every item of labor and material is a cash charge, and no officer or owner gives any time without compensation, as is the case in very many Independent companies. The exhibit is not intended to be an illustration of the average exchange, but a selection was made of the eight which the writer believes to be the best conducted among a large number which he has visited. It is thought that the figures are sufficiently high to be safely used as a basis for estimating.

Having made a liberal estimate of the cost of the plant, always allowing in the wire plant thirty-five per cent. margin over the actual number of lines in use, ascertain the cost per telephone, then calculate the depreciation and add to this item the cost of operation. In example E the average cost of the plant per telephone is $98, and being exceptionally well equipped with cable seven and one-half per cent. is considered a fair allowance for depreciation. This amounts to $7.35, which added to the item of operation makes a total of $20.20. Allowing five per cent. for extraordinary damage and eight per cent. for interest on the investment, $12.74 must be added, making a total of $32.94, which must be received as the average earnings of each line in the exchange. But there are other sources of income, extensions, toll commissions, etc. Estimating $3 per line as a fair allowance, although local conditions will modify these figures, and adding two per cent. of the total receipts for lost accounts, the final figure, $30.54, is arrived at.

Supposing that sixty per cent. of the telephones are residence lines and forty per cent. business, it is quickly found that the business rate should be approximately $40 and the residence rate slightly over $24 per annum.

It may be found that these rates are higher than can be secured. Should this be so then recourse must be had to the party line, reducing the cost of the plant greatly and reducing the income but slightly. This panacea for the ills of cost and compensation was long ago discovered by the Bell company, but the remedy was so easy to give that it was administered in too large doses and the patient sickened. The prescription, however, is a good one, and is the proper solution of the problem in many localities. But that is another story.

As the exchanges mentioned herein are all manually operated, the figures, obviously, will not apply to automatic work. Up to the present time complete and reliable data on the cost of operating large automatic exchanges over periods long enough to make it of value have not been available. It is expected, however, that these figures will be at hand for presentation in an early paper, for a discussion of the problem of cost and compensation would be but partially complete without them.

THE ROCKY MOUNTAIN BELL'S LATEST EFFUSION

SOME time ago the Rocky Mountain Bell Telephone Company issued a remarkable circular in which it claimed prior right of telephone numbers under the copyright law. This absurd claim was ridiculed from one end of the country to the other, yet the company does not seem to have profited by the experience, for it has issued another remarkable document in the shape of a reply postal card. This reply postal card on the sending half contains the statement that the Rocky Mountain Bell Telephone Company now has 6,000 subscribers in Salt Lake City. By actual count the number of subscribers is 4,760, of which 800 are individual circuits, the balance being party lines. Then the writing on the card states that the best telephone service is obtained by the use of standard instruments, and like all standard instruments, which are delicate, they are liable to get out of order.

Some of the standard instruments it refers to are old Blake sets working on grounded lines. The company further states: "We assume that the instruments are in good working order, unless notice to the contrary is given to the company." We do not exactly see what the duties of wire chiefs and inspectors can be when these conditions are assumed, and finally this remarkable effusion concludes with: "If you have any complaint to make at any time of service or attention, please mail attached card and also give notice, either by telephone or personally." The reply half of the postal card has a space for the telephone number, street address, nature of trouble, the name of the party, and date.

After the Bell telephone companies have been publishing the fact that "the mail is quick, the telegraph quicker, and the telephone instantaneous," it seems rather ridiculous that they should resort to the mail for information respecting a telephone. The real truth of the whole situation is this: The Utah Home Telephone Company is rapidly coming to the front, and whereas formerly any old sort of service would do, now the Bell Company sees the folly of its ways, and like a drowning man catching at a straw, is making desperate efforts to square itself with the public.

Throughout the whole State of Utah, the Rocky Mountain Bell Telephone Company is the butt of all the latest comic jokes. At Logan and Provo, the public is up in arms against it. So badly scared is the Bell Company in Salt Lake City that it has secured all the billboards available and covered them with announcements as to its greatness. Blowing one's horn may be a good practice when there is something worth while to blow about, but it appears in this case that it would have been better had the unsophisticated Bell advertising manager concealed his light under a bushel. An old, worn-out phrase of Lincoln's, "You can fool some of the people all the time, and all the people some of the time, but you can't fool all the people all the time," would have been a first-rate maxim for the Bell Company to have adhered to.

CANASTOTA, N. Y., REVOLTS AGAINST BELL.

THE circular letter recently received by Canastota subscribers from the Central New York Telephone & Telegraph Company, to the effect that contracts for telephones at the $24 and $15 rates must be signed and returned before August 1st or telephones will be taken out on August 15th, has started the Independent exchange ball rolling again.

John W. Souter, who has conducted the fight against the advanced rates on behalf of the Canastota subscribers, stated that he would especially request all subscribers not to sign the contracts until the Independent question has been thoroughly threshed out.

The Farmers' Telephone Company appears to be the concern most liable to install a new exchange here. A meeting of the directors has been called at which the capital stock will be increased from $1,000 to at least $10,000, this move to be taken with reference to the Canastota exchange project. Two other concerns have also recently made propositions regarding exchanges.

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THE USE OF THE PEG COUNT IN CENTRAL OFFICE OPERATION.

By A. Dallam O'Brien.

ARTICLE III.

UPON the proper distribution of the operating force in the central office depends the efficiency and class of service given to the subscribers, and the previous knowledge of the time or times during which the central office is called upon to handle the bulk of its traffic enables the manager to distribute the operating force to the best advantage. From the hourly data obtained from the peg count, the load curve is plotted, and from this curve the variations in the amount of traffic handled throughout the twenty-four hours can be seen at a glance and the operators' working hours arranged so as to have the maximum force on hand at the time of maximum demand.

The curve shown in Fig. 5 is a typical load curve for a central office handling 10,000 originating calls per day. The characteristics of this curve are very marked, and it does not require a close inspection to show at just what times it is necessary to keep a large operating force on hand, and, also, when such a force would be superfluous. Starting at 12 o'clock midnight and following the curve until 6 A. M. the load is seen to be practically nothing, and the number of night operators between these hours will be small. At 6 o'clock the curve begins to rise rapidly until it reaches its maximum between 11 and 12 A. M., at which time

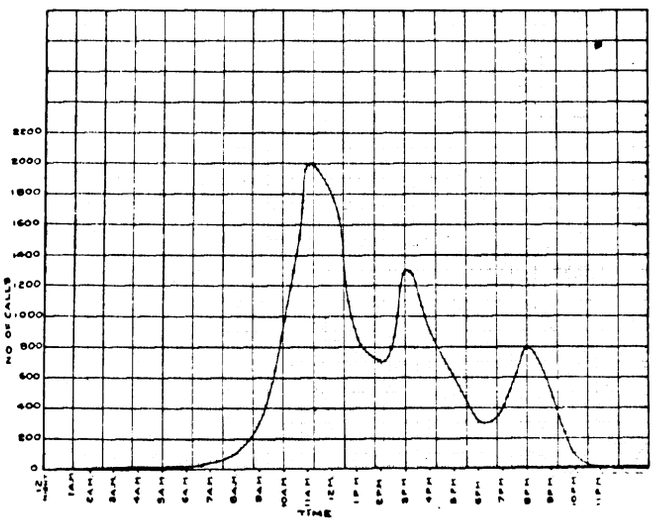

Fig. 5.

the office is handling its greatest load. From 12 until 2 the curve drops somewhat, this period representing the time during which the subscribers are at lunch. From 2 o'clock until about 3.30 the load rises again and reaches a high point, which, however, is not, as a usual thing, as high as the peak reached in the morning. After 4 o'clock the load drops off rather sharply until nearly 7, when it begins to pick up and reaches another high point around 8 o'clock, and from this point drops off rapidly, as shown.

In central offices which are located in a district which is entirely confined to business interests, it is probable that there will not be such a rapid rise of the curve between the hours of 6 and 8 P. M., and that the afternoon peak will be higher, but in residential sections and in districts containing places of amusement this evening rise will be decidedly perceptible and provision must be made to care for it. On the basis of the curve shown, it may be well to consider the distribution of the operating force employed by one large company with which the writer has been connected. The operators' working hours are divided into a number of different turns, as follows: First, operators whose time of duty is from 7 A. M. until 5 P. M.; second, operators whose time is from 8 A. M. to 6 P. M.; third, at 9 A. M. the relief operators come on duty and work until 1 P. M., and again come on duty at 6 P. M. and work until 10 P. M. At 7 P. M. the night operators report and are on duty until 7 A. M., being divided into two reliefs, as will presently be explained. From this distribution of force it will be seen that the peak of the load which occurs in the morning is taken care of by the maximum number of operators, and that the relief operators again assist the night operators in handling the smaller peak which occurs in the evening.

Except in unusual cases the regular day operators are entirely able to take care of the afternoon load. As the amount of traffic to be handled between the hours of midnight and six in the morning is so small, and as the night operators are assigned to a term of duty lasting twelve hours, it is customary to divide the night force into two shifts and thus allow the operators some time for rest. In the case cited, half of the night force are relieved from duty from 11 to 11.30 P. M., the other half being relieved from 11.30 until midnight; during this time the operators have their lunch. At midnight the operators whose lunch time extended from 11 until 11.30 are allowed to retire to their quarters and sleep until 3 A. M., at which time they again come on duty, take the place of the other relief, who, in turn, are allowed to sleep until 6 A. M. At 6 A. M. the entire night force is on duty and remains so until relieved by the first detachment of day operators, who report at 7 A. M. As will be noted in this distribution of the operating force, the night operators are practically on duty for twelve hours, as it is questionable whether three hours relief which is allowed them fulfills its purpose. It is far better practice to cover the switchboard with relief operators up to 10 P. M., and thus allow the night force to serve from 10 P. M. to 7 A. M. at some time allowing an hour or so for rest. The operator will be able to do more efficient work under these circumstances and will not be subject to so great a strain upon her vitality.

The operation of a central office containing a multiple switchboard during periods of light loads, when only two or three operators are employed in handling from twenty to thirty positions, is readily accomplished by stationing two operators at the switchboard to handle originating calls and one operator at the incoming circuit positions to handle all incoming trunk calls, the incoming circuits all being connected on one position by means of switching keys, and in addition having one operator on the floor to act as a patrol. The night bell, which forms an adjunct to the switchboard, is thrown into service as early in the evening as the traffic warrants, and it is the duty of the patrol, when the night bell rings, to locate the calling line and call out its number. The line is then taken up by one of the operators in its multiple jack and the call completed in the usual way. This method of operation is a very simple and efficient one where central energy switchboards, with lamp signals, are employed, and the patrol is easily able to locate the calling line. In the case of the magneto boards, with the drop signals, the operation is necessarily not as rapid, as it may take some time to locate a fallen drop.

In cases where it is desired to determine the relative loads upon the different operators' positions, in order to effect a redistribution of lines, should the results of the investigation show it necessary, individual peg counts may be taken for each position without involving much additional labor, and the position load curves plotted and compared, thus giving an accurate method of determining the load on each operator, and this information, with the aid of the intermediate distributing frame, enables the

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central office manager to properly divide the load among the various operators.

From a comparison of peg counts extending over a considerable number of months, curves can be plotted showing the rate of growth of the different classes of lines in each exchange; the changes that occur in the calling rate of each particular class and the rate of growth of the number of connected stations. With this data at hand, it becomes a comparatively simple task for the engineer to estimate upon the required equipment for any given central office necessary to meet the needs of that office during a given period of time, and, consequently, where such records are accurately kept the exchange manager is enabled to keep his equipment somewhat ahead of the growth of the office and is not continually cramped for facilities.

It is customary when adding to the equipment of a central office to provide for a period of growth covering about three years from the date of the addition. This length of time is used for a number of reasons. In the first place, it would naturally be poor policy to install equipment which would bring in no return on the investment for a considerable length of time, and, in the second place, when installing equipment to-day it is quite a question as to how long it will be before such equipment is out of date. It is necessary, however, in order to assure satisfactory operating conditions, that the time spent in having an equipment force working in a central office be reduced to a minimum, as there is always more or less trouble produced at such times and the efficiency of the service more or less impaired. Aside from this consideration there is the additional fact that the addition of equipment in small lots is considerably more expensive than where it is added in bulk, and this is naturally a point that is carefully considered. From the foregoing description of the peg count, and the results which may be derived from its intelligent application, it may be readily comprehended that the time and labor necessitated in its preparation are entirely justifiable and that the knowledge gained thereby will much more than pay for its cost.

While the methods outlined herein are as a usual thing applied to the regular monthly count, yet there are numerous circumstances that arise in central office operation which fully warrant special applications, particularly as applied in individual positions, and it will be found that an intelligent use of such special tests will have a great effect upon the efficiency of the service given to subscribers. It is to the public that a telephone company looks for its revenue, and where there are competing companies the one that furnishes the best service gets the subscribers, and it is invariably the case that the manager who has the most intimate knowledge of the traffic conditions existing in his exchange is enabled to render to the public a class of service that satisfies existing subscribers and brings in new ones.

OPERATORS' TROUBLES IN LONDON.

THAT the telephone girls in London do not differ from any other class of people who have to earn their living, is evidenced by a report received of a strike which they conducted for shorter hours at the new Holborn exchange. It appears that the girls had signed contracts for forty-five hours a week, but were called upon later to sign their names to a rule book which would compel them to work ten hours a day. Under the old agreement the girls worked from eight to eight and one-half hours a day, with a five-hour period of duty on Saturday. Under the new agreement they were supposed to work two extra hours without pay. Many of the senior girls would not sign, and seventy of them refused to return to duty till the obnoxious clause had been cut out of the rule book.

In an interview, one of the operators said: "For the extra two hours we are offered no additional pay. Our wages are small, only 10s. ($2.50) a week, and the matter of increase is only periodical—1s., or twenty-five cents, after the first six months, 1s. after the second, and 1s. for each following year. Now these raises in salary are always affected by the black book. This black book is a register in which all the heinous crimes committed by the girls and breaches of discipline are counted against a raise. For instance, if one girl should surreptitiously answer 'yes' to a subscriber instead of a number, there is a black mark against her record. One day a girl broke a pearl necklace. For stopping to collect the scattered pearls, the enormity of the crime was referred to in the black book as 'playing with beads.'"

It appears that the girls have other woes besides a matter of salary and a black book. One of them complained that the chairs were too hard, and another one that the weight of the new receivers makes them instruments of torture, and still a third claimed that the little electric lights instead of targets were causing them to develop a squint. When interviewed, the manager of the Holborn exchange had nothing to say, except that hitherto the girls had worked for a shorter period than they had signed for, and now that the full time was required they were discontented.

To keep the switchboard in operation, relief operators were drawn from the other London exchanges. Twelv girls, however,, on their way from the Gerrard exchange, were met by the strikers, and, of course, wanted to hear all about it. When the tale of woe was unfolded, the Gerrard girls one and all turned to the right about and marched back to Gerrard in a body, saying they would not play the part of scabs. Sad to relate, however, for their honor, they were promptly dismissed with a week's pay.

The telephone girls employed by the post office are also complaining. Once in three weeks they have to do Sunday duty. Said one of them: "For this extra service we only receive the munificent sum of 3s. 9d. ($0.93), then I have to give up my whole day, pay my railroad fare, which is $0.16, and buy my dinner. We are trying to get a minimum rate of pay of 5s. for Sundays. We are the only body of women in the civil service who have to work on Sunday."

When the wages paid English operators, or for that matter European operators in general, are compared with the scale of wages paid for the same duty in this country, it would appear that they have a just cause for complaint. Girls that are just starting in the business in this country earn $2.00 a week, whilst competent operators earn from $6.00 to $10.00 per week, the working hours being about the same.

As a result of this and other grievances, the operators have decided to form an alliance to be known as the National Association of Telephone Operators.

REPORT OF GLASGOW CORPORATION SYSTEM.

THE third annual report of the Telephone Committee of Glasgow shows that the total revenue for the year ending May 31st last amounted to £49,639, while the working expenses totalled £29,119. The gross surplus, therefore, was £20,520. After deducting interest on loans and sinking fund charges a net profit of £3,651 remained. There are now 11,405 telephones in service, 9,065 partially finished lines, and switchboard accommodations for 12,062 lines. The length of the underground cable is nearly 205 miles. The rate at the end of the year was about 18,000,000 calls per annum. The number of public pay stations has increased to 235.

Mr. A. R. Bennett, consulting engineer to the undertaking, noted that the gross cost per line at Glasgow is £28 2s. 6d., including a portion of the preliminary expenses, exclusive of which the gross cost per line would be £20 6s. 6d. This is about 25s. per line more than the original estimate, due to the adoption of underground distribution in the city, where overhead work had been allowed for. With a net surplus of £3,651 this year and £2,092 last year, the assertion that the rates of £5 5s. for unlimited service and £3 10s. per annum and 1d. per call are too low, appears to be totally wrong.

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UNDERGROUND VS. AERIAL CONSTRUCTION.

WHEN shall conduit be used is a difficult and ever recurring question to the telephone exchange manager. In a general way, he understands that circuits which are underground are exempt from many of the disturbing influences which prey upon the overhead line. No sleet storms can touch an underground cable, nor can the fiercest hurricane which ever blew cause a moment's uneasiness to the company whose lines are in a conduit. So much was certain, but conduits are expensive things, and what might happen in case of an extensive fire no one knew. The crash of a falling wall might, it was urged, crush the conduit walls or the heat of incandescent brick might reach the cable and melt the easily fusible lead sheath and in a few moments work incalculable injury. There was no experience to show how an expensive conduit system would survive a severe conflagration, and many felt that the fire risk was too great a hazard to be lightly incurred. The way in which the Baltimore subways passed through the fiery ordeal, which visited that city last winter, has destroyed the only objection and removed the only fear which in the past has involved the conduit system.

During the progress of the fire thousands of tons of incandescent brick to which as much more weight in "I" beams and structural iron was added, were precipitated into the streets, in many cases covering the surface of the pavements twenty or thirty feet in depth. In an endeavor to check the progress of the flames many buildings were blown up with dynamite and the shock of these explosions added to the impact of the falling building material. Finally the fire department so flooded the streets that in many cases the conduits were completely submerged. How had the conduit survived was anxiously queried by the owners of hundreds of miles of cable.

As soon as practicable after the fire an expert commission was appointed to investigate the condition of the subways and report as to their condition and ability to survive an ordeal of unprecedented severity. The report of this commission has just been rendered. Within the burnt district there were about 13,825 feet of trunk line conduit, containing 49 manholes located at street intersections. There were also about 26,325 feet of distributing conduit containing 24,365 feet of house service, including 123 junction boxes, 230 service boxes and 876 individual house connections. Careful examination of the trunk line conduits failed to reveal the slightest injury to any structural part of the system. In two instances the cast iron plates covering the manholes were broken by the falling walls, and, where to reduce the noise of traffic, the covers had been filled with asphalt, this was melted and had to be replaced. The trunk line conduits were placed within two feet of the street level. The manhole roofs were brought to within 22 inches of the street surface and were composed of 10-inch "I" beams; none of the manhole roofs were injured in the slightest.

The distributing conduits were more exposed because such lines are laid close to the sidewalks in shallow trenches, broken every 60 or 70 feet by service boxes. On the whole, it appears that the distributing systems came through the fire unscathed; the only damage that has so far been noted is that resulting from gas explosions.

DESIRABILITY FOR THE USE OF CONDUIT.

The conduits contained the cables of the United Railways and Electric Company, the United Electric Light and Power Company, the Maryland Telephone and Telegraph Company, the Chesapeake and Potomac Telephone Company, Postal and Western Union Telegraph Companies, and the power leads of the Baltimore and Ohio Railroad Company. In almost all cases the service connections at the ends of the cables were completely destroyed, irrespective of whether such connections entered through the house walls or whether they were on poles leading to aerial distributing systems. But with the exception of the injury to the distributing points, none of the cables of either the electric light or power, or of the telephone and telegraph service was injured.

Mr. Charles E. Phelps, chief engineer of the electrical commission of Baltimore, under whose direction this report has been compiled, draws the following conclusions:

"First. The only safe and sure investment for a transmission or a distributing system is one made beneath the surface of the street.

"Second. Any reasonably well-constructed system of underground conduits is proof against damage and interruption to service, even when subjected to such unusual stresses as occurred during the fire of February 7th and 8th last.

"Third. With underground house connections, the only damage sustained is at the house, and as the house is destroyed, the revenue-earning capacity of the connection is gone, but it is perfectly feasible to so protect the house ends of connections that a new splice may be made in the cellar instead of going back to the cable in the distributing line. All the cables entering cellars were burned off so close to the mouth of the duct that there is no room for a new splice, and service connections must be renewed from the service box; this does not represent a large loss.

"Fourth. With reference to ventilating the system as a precaution against gas explosions, the only recommendation to be made is one looking to a continuance of effort to provide an efficient method of sealing house connections at both house and service box ends to prevent fire in buildings from communicating with an explosive mixture in service boxes.

"Fifth. The provision made for ventilating the trunk manholes is adequate even under such conditions as existed during the fire, which, together with the weekly inspections, should be continued, with such improvements as may, from time to time, be found to have merit.

"Sixth. The house-to-house system should be extended, but without, at this time, any specific recommendations.

"Seventh. Although every pole and pole connection within the burned district was destroyed, the method of pole distribution is perfectly practicable and satisfactory in residential and business sections where service connections are infrequent and where a house-to-house system would not be economical."

On the ground of expense, many telephone companies have hesitated, and still are hesitating, to employ conduit systems, but the experience of the past has, in all cases, shown the wisdom of placing the wire plant in conduit, even in cases where the telephonic density is comparatively low. Experience has shown beyond a cavil that the annual charges of maintenance and depreciation upon pole lines are usually greater than the charges upon the capital invested in such a conduit system as will contain it. The watch-word of the Independents has been "GOOD SERVICE." The modern switchboard and the substation are so highly evolved that little complaint arises from their performance, but the old pole line is as inadequate and unsatisfactory as a magneto system. Modern practice is constantly reducing the cost of conduits and the expense of installing them, until now, underground lines in any but the most sparsely populated of telephonic districts, can be constructed more cheaply than overhead wire.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

RURAL HIGHWAYS IN OHIO.

We are constructing some farmers' lines west of here. About three miles out we are held up by two old ladies owning both sides of the road. Kindly advise, through your journal, the law concerning rural highways in Ohio, and the mode of procedure in a case of this kind. S. R. N.

THE statutes of Ohio provide that telephone companies may construct "lines from point to point along and upon any public road by the erection of the necessary fixtures, including poles, posts, and abutments necessary for the wires; but the same shall not incommode the public in the use of such roads." Further, "any such company may enter upon any land . . . for the purpose of making preliminary examinations and surveys, with the view to the location and erection of lines . . . and may appropriate so much thereof as may be deemed necessary for the erection and maintenance of its . . . poles, piers, abutments, wires, and other necessary fixtures, and for stations, and the right of way over such lands, and adjacent lands, sufficient to enable it to construct and repair its lines." Another section provides that "no such company shall, without the consent of the owner thereof in writing, enter any building or edifice, or use or appropriate any part thereof, or erect any pole, pier, or abutment in any yard or in any enclosure within which an edifice is situated, nor . . . erect any pole, pier, abutment, wire, or other fixtures, so near to any edifice as to occasion injury thereto, or risk of injury in case such pole, pier or abutment be overthrown, or injure or destroy any fruit or ornamental tree."

Interpreting this statute, the Ohio courts hold that it does not give the right to telephone companies to erect their poles and wires in a highway without first making compensation to the owner of the abutting property. It is therefore necessary for your company to either purchase the right of building your line from the old ladies who interfere with you or else to commence proceedings in court for the condemnation of the right of way you seek along the highway. This you can do under the statutes which accord the right of eminent domain to telephone companies. See Statutes, sections 3454-3471.

Smith vs. Printing & Tel. Co. 2 Ohio Cir. Ct. R. 259, 2 Am. Elec. Cas. 237.

PROPER LOCATION OF POLES.

THE Court of Civil Appeals of Texas has rendered a decision setting forth the rule to be followed by telephone companies in placing their poles in public streets. The suit was brought by one Billingsly against a telephone company to recover damages for personal injuries sustained by his wife in being thrown from a buggy by reason of the company's negligence in placing one of its poles in a street of Beeville, Tex. The defence was that the company was authorized to place its poles where it did, and that the pole with which the buggy collided was placed where it would not interfere with the safe use of the streets by the public. The pole was set at the intersection of two streets, 9½ feet from the intersection. Plaintiff recovered a judgment of $1,000. The court affirmed the judgment. In Texas telephone companies are authorized by statute, to set their poles between and across any of the public streets in the State in such a manner as not to incommode the public use of the streets. The decision said that courts are inclined to construe the right granted as subject to the implied condition that the poles shall not be so located as to be dangerous. It held that a telephone company was bound to use reasonable care in the construction and maintenance of its poles, so that travelers along such streets, in the exercise of ordinary care, shall not be discommoded or injured by coming in collision with them, and whether it has used such care is a question of fact for the jury. The defendant contended that the accident was really caused by the momentary swerving of the horse and not the location of the pole, but the court held the location of the pole to be the proximate cause of the collision. Alice, Wade City & C. C. Telephone Co. vs. Billingsly (Tex.), 77 S. W., 255.

DURATION OF CONTRACT FOR CONNECTIONS.

THE Constitution of Kentucky provides (Section 199) "that telephone companies operating exchanges in different towns or cities shall receive and transmit each other's messages without unreasonable delay or discrimination. The general assembly shall, by general laws of uniform operation, provide reasonable regulations to give full effect to this section. The Campbellsville Telephone Company built an exchange at Campbellsville; the Lebanon, Louisville & Lexington Telephone Company built an exchange at Lebanon, and the two companies then agreed to unite their lines at Phillipsburg, a point about midway between Campbellsville and Lebanon. This was done in accordance with a contract which required the two companies to transmit each other's messages over the lines so extended and connected. Both were Independent companies. Subsequently, a licensee of the Bell patents, the Cumberland Telephone Company, acquired a controlling interest in the stock of the Lebanon Company and built a line from Louisville to Lebanon, there connecting with the Lebanon exchange. Later an Independent line was built from Louisville to Campbellsville by the Independent Long Distance Telephone & Telegraph Company, there connecting with the Campbellsville exchange. When it was attempted to use the joint line by way of Phillipsburg, to transmit messages from Louisville to Lebanon by way of the Independent and the Campbellsville Companies, the Lebanon Company refused to make the connection at the Lebanon exchange, and excluded the message. The Campbellsville Company then brought suit for mandamus to compel the Lebanon Company to receive the messages over its wires, and to make the necessary connections therefor, thus seeking the specific execution of the contract between the two companies.

The circuit court denied the writ, from which judgment the Campbellsville Company appealed. In construing the contract there were two points that gave rise to controversy. First, it failed to state for what length of time the connection and the agreement were to continue. The Campbellsville Company contended that it was to endure at least during the corporate lives of the two companies. The Lebanon Company contended that it was determinable at the will of either of the parties. Second, did the contract include messages originating elsewhere than at Lebanon or Campbellsville or on the line between those points? The Campbellsville Company affirmed that it did; the Lebanon Company that it did not. The court held that the provision of the constitution previously quoted made it the duty of the two companies to connect, even though there was no penalty provided for failing to do so. It was therefore concluded that the contract was not determinable at the will of either of the parties to it, but that it must continue during the corporate existence of the two companies. Upon the second point the court sustained the contention of the Campbellsville Company, for the reason that the contract was construed by the parties, in their practical application of it, to mean that messages originating in Louisville, destined for Lebanon, might be passed by the Campbellsville Company through its exchange over the joint wires of the two contracting companies, to its destination. Judgment was accordingly reversed. Campbellsville Tel. Co. vs. Lebanon, Louisville & Lexington Tel. Co. (Ky.), A. S. W. 1114.

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IN THE OPERATING FIELD.

MINNESOTA TELEPHONE ASSOCIATION MEETING.

THE Minnesota Telephone Association will hold a convention in Minneapolis on August 31 and September 1. Two meetings will be held and arrangements have been made to hold them at the fair grounds on the afternoon of the dates in question. Executive sessions will be held in the executive building on the fair grounds. A large number of interesting papers will be read and it is the desire of the association that as many telephone men as possible will be present.

INDEPENDENT TELEPHONY IN WHITLEY COUNTY, IND.

WHITLEY COUNTY, Indiana, is reported to have more telephones in service operated by one company than any other county in Indiana, averaging one telephone to every twelve inhabitants. In Columbia City and the towns of South Whitley and Churubusco, the figures are still more surprising, for they show one telephone to every seven persons. The Whitley County Company operates five exchanges, and since it has abolished toll charges, the demand for telephone service is unprecedented. Manager Thompson says that the company is now giving service to 1,500 subscribers, and at the present rate of increase it will connect with over 2,000 patrons before the close of the year. Since the February directory was issued, more than 300 new subscribers have been secured. The average number of new connections made during any week is in the neighborhood of 20.

READING A TELEPHONE CENTER.

THE Pennsylvania Telephone Company is now building a line from Kutztown, taking in Windsor Castle, Virginsville, Lenhartsville, Dreibelbis and Kempton. It will be seventeen miles in length and will be connected with the Kutztown exchange. Later on it is the purpose to build a line, taking in Dryville, Moselem Springs and Kirbyville. Other villages in the county that are now isolated from communication with the city will eventually be brought in touch with Reading. It is the purpose of the company to spread out in all directions so that in a few years every village and hamlet in the county will enjoy telephone service. All the large towns are now connected, and it will not be long before it will be possible to reach all sections of the county. The telephone officials are being besieged with applications for the service.

THE SITUATION IN EVANSVILLE.

THE Citizens' Telephone Company, of Evansville, Ind., capitalized by local merchants, withdrew its petition for a franchise at the last meeting of the common council. At the same meeting the Home Telephone Company, similarly organized by local capitalists, appeared and asked for a franchise. The new company agrees to pay the city $3,500 a year for the use of the streets and alleys.

The withdrawal of the Citizens' Company was by agreement with the Home Company, some difficulties having arisen with the earlier company due to entanglement in politics of the city administration.

This movement is to secure a franchise for an Independent company to operate in the city before the State Court of Appeals hands down its decision ousting the Cumberland Company. The latter company already admits its defeat at the hands of the Independent interests, and is making desperate efforts to secure a franchise from the City Administration. The decision of the court, if against the Cumberland Company, not only ousts its lines from the city, but makes it liable for a suit for the two years past that it has operated in the city without a franchise. If a franchise is not secured at once, Evansville will be without telephone service when the Cumberland is forced to quit business, consequently an early passage of the Home Company's franchise is looked for in order that its construction work may be well under way and a system near enough completed to give service when the decision of the court is handed down, which is expected to be not later than December 10th.

LOUISVILLE HOME COMPANY REWARDS OPERATORS.

IN all large companies traffic inspectors are employed whose business it is to make records of the time it takes operators to answer and also to look after complaints which subscribers may make regarding the service. Manager A. L. Têtu, of the Louisville Home Telephone Company in conjunction with this method of traffic inspection, instituted a series of prizes, amounting to $100 a year, which are to be distributed in amounts of $50 semi-annually to the five operators who show the best records for the preceding six months. The result of this incentive to good operating has been most remarkable. The winner of the first prize this time was Miss Theresa Dierkes, who answered 130 test calls made by inspectors from the subscribers' stations under the stop watch, each call being answered on an average of 1.8 seconds. In addition to this the young woman did not lose one hour during the six months nor was a single complaint registered against her, either from subscribers or supervisors. This is a most remarkable record, one that is seldom equalled and never excelled.

During the six months in which the test took place the total number of test calls made was 7,024. The total time required in answering was 16,158 seconds, or an average of 2.3 seconds per call. This, it is believed, compares most favorably with any other operating statistics. The prizes distributed were as follows:

	In Gold.
First Prize	$15.00
Second Prize	12.50
Third Prize	10.00
Fourth Prize	7.50
Fifth Prize	5.00

It appears from the above that Manager Têtu struck the right chord in appealing for the co-operation of the operators in improving the service, and it is certain from a financial standpoint that the amount of money distributed in the form of prizes is more than made up for by the increase in efficiency of operation.

THE ONTARIO COMPANY PROSPERS.

AT the semi-annual meeting of the directors of the Ontario Telephone Company, held at Oswego, N. Y., a semi-annual dividend of three per cent. was ordered. The report showed that the company's business is in a very prosperous condition, the increase for the past six months having been twenty per cent. The report on toll line construction was a very encouraging one and went to show that before the end of another three months connections would be made with Rochester, Buffalo and all the lake towns.

This company operates exchanges at Oswego, Hannibal and

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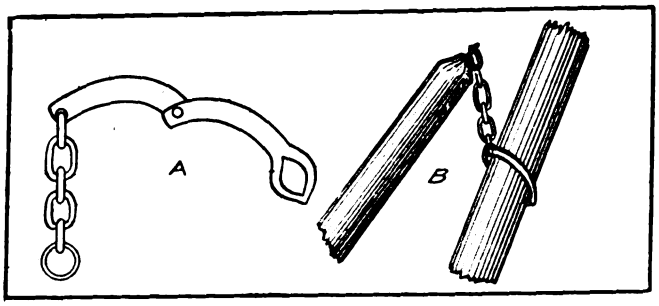
several other towns along the shore of Lake Ontario. A new directory, soon to be issued, will include one or two novel features. It will contain a classified business directory. The business houses will be separate from the private lines.

IMPROVEMENTS AT FORT ATKINSON, WIS.

THE Jefferson County Telephone Company, at Fort Atkinson, Wis., has recently completed the work of overhauling and repairing its outside construction, placing everything in first-class condition, and has also re-equipped the entire exchange throughout by installing a new 600-line capacity, self-restoring drop switchboard (400 lines being equipped at present), new protective devices, etc. The central office equipment, as well as the new telephones necessary to meet the increasing demadn for service, were furnished by the International Telephone Manufacturing Company, of Chicago. The Jefferson County Telephone Company is rapidly coming to the front as one of the most progressive Independent companies in the State of Wisconsin.

CLIP FOR POLE-RAISING DERRICK.

IN raising poles by means of pole-raising derricks one of the most important features is the clip which is used to hold the pole. This clip should be of simple construction, yet strong and sure of action. Mr. F. D. Byler, whose derrick we described in our issue of February 27, suggests the one illustrated herewith. Its method of application is apparent from the drawing in



which *A* represents the general detail of the clip and *B* its application. Care should be taken in its manufacture that all the parts are of a thoroughly substantial nature and that the clip is large enough to grip any sized pole, yet not too large to allow of its slipping.

LARGE IMPROVEMENTS FOR U. S. COMPANY.

THROUGH the consummation of a deal between the United States Telephone Company and a syndicate of Cleveland and New York capitalists the company has been able to borrow $450,000. By means of this loan a large number of contemplated improvements will be made that will enable the company to greatly increase its earning capacity. The United States company is now earning $400,000, and with the use of the major part of the loan it is confidently expected that $200,000 a year will be added.

CHICAGO TELEPHONE COMPANY IN A QUANDARY.

DEVELOPMENTS in the suit brought by Charles A. Brown, an attorney in Chicago, to prevent the Chicago Telephone Company from interfering with the use of a private branch exchange which he has installed in his office, tend to show that the Chicago Telephone Company realizes a position which is, to say the least, detrimental to its welfare. Our readers may remember that Mr. Brown installed a Stromberg-Carlson switchboard in his office for his private use and had connections made with the Bell lines entering the office. The suit is brought to restrain the Chicago Telephone Company from disconnecting its service from the switchboard. After delaying as long as possible the Chicago Telephone Company secured a change of venue from Judge Tuley, who had granted the injunction, on the ground that Judge Tuley was prejudiced, and had the case docketed before Judge Brown. On about the last day allowed under the rules of court the Chicago Telephone Company filed a general demurrer to the bill of complaint.

Mr. Brown's counsel served notice and had the argument on the demurrer set down for hearing. The court set aside a whole day for the argument, but on the day before the argument was to be heard the defendant voluntarily withdrew its demurrer and asked and obtained ninety days in which to prepare and file its answer. These ninety days have not yet expired. Should the case go against the Chicago Telephone Company, as is confidently expected, it will serve as a precedent to all parties throughout the country who may desire to install a branch exchange and compel any Bell company to connect its lines with the switchboard.

ANNUAL DINNER OF NATIONAL CO.'S STAFF.

THE eleventh annual dinner of the National Telephone Co.'s staff was held in London recently. The company numbered about 230, including several of the officers and representatives of the 12,000 employees.

The annual budget was read and showed that the company now had in Great Britain and Ireland 1,095 exchanges, an increase of 45 compared with the preceding year. There are now 300,000 subscribers' stations, an increase of 40,000 from the foregoing year. During the last year it was shown that 938,000,000 telephonic messages had been transmitted.

Within the last ten years the number of exchanges had increased 103 per cent. In the same interval the number of stations had increased from 80,000 to 300,000, or 275 per cent., while the number of messages increased 283 per cent. The gross revenue increased from £750,000 per annum to £2,000,000, while the cost per message had fallen from .72d. to .41d.

It was further stated that the telephonic service of the company was now better than that of any other European power, though behind that of the United States. The company had never been in a firmer financial condition than it was at present. A comparison of telephone conditions in the United States with those of Great Britain occupied the attention of a large number of the speakers.

A musical programme was rendered during the dinner. The camaraderie of the members of the staff, who all appeared to know each other and to appreciate keenly their annual reunion, made the affair highly successful.

THE SITUATION AT KINGSTON, ONTARIO.

THE question of a telephone franchise is agitating the city council of Kingston, Ontario. The agreement of the Bell Company expired some time ago, and its renewal is awaiting an understanding on several points. The Bell Company offers the city, in recognition of an exclusive franchise, the munificent annual sum of $700, exclusive of the value of its free telephones and also the use of its poles for fire alarm wires. This is desired for a period of five years. Other companies have requested that the exclusive franchise be not given to the Bell Company, several companies desiring permission to install systems. One of these is the Canadian Machine Company, another the Canadian Telephone and Telegraph Company.

It is very evident that there is a need for a hustling Independent man to take hold of the matter. Kingston is a progressive town, and it is certain that the people would rather see an Independent system installed with reasonable rates than to continue in the old Bell régime with its extortionate charges. What has been done in other Canadian towns is ample proof of the desirability of an Independent system which would be able to furnish service as well as is done by Independent companies in the States.

EXCHANGE VISITING DAYS.

AS a method of instruction for its subscribers, the Home Telephone Company, of Toledo, has introduced what are known as visiting days, when all who care to call may inspect the exchange and apparatus. The first two visiting days were July 21 and 22, the time being from 10 A. M. to 9 P. M. Quite a large number of Toledo people took advantage of this opportunity to learn something about the mysteries of a telephone exchange and its operation.

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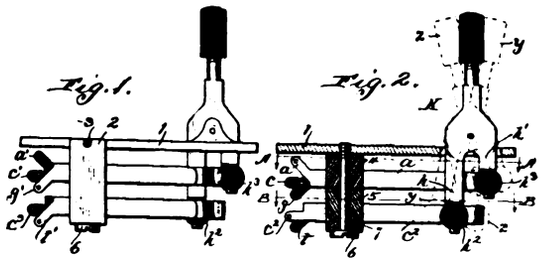
TELEPHONE PATENTS

SWITCHBOARD KEY.

W. E. McCormick, of Chicago, Ill., patents (No. 764,143) and assigns to the International Telephone Manufacturing Company, of Chicago, Ill. This is an invention to provide an improved key to be used upon the cord shelf of a switchboard, and is shown in Figs. 1 and 2. There is an escutcheon plate 1 which supports the key upon the cord shelf. To this a piece of insulating material



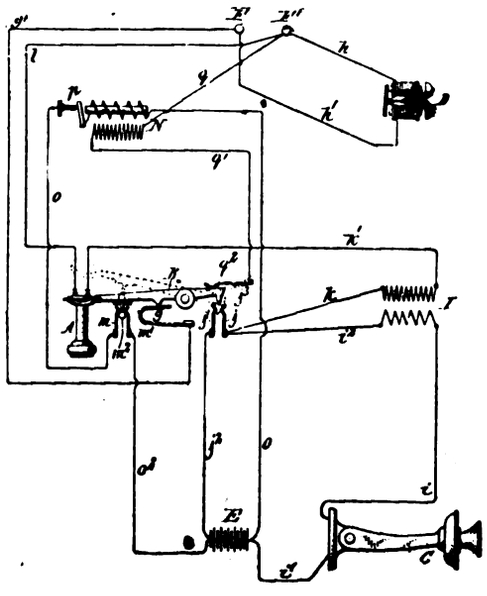
2 is attached which holds two sets of springs. These springs may be arranged in any desired manner to suit the circuit to which the key is applied. The lever of the key *K* has two rubber rollers *k2* and *k3* as shown in the figures. It will be seen from the drawings that moving the key in the direction of *z* will cause the roller *k2* to operate its springs, while in moving it in the direction of *y* the lower springs are unaffected but the roller *k3* operates the upper set of springs.

ANTISEPTIC ATTACHMENT.

J. Freel, Ladysmith, Canada, patents (No. 762,039) an antiseptic attachment for transmitters. The inventor provides a septum of silk or other material impregnated with an antiseptic compound which is to be stretched across the front of the transmitter funnel and secured in place by an elastic ring.

SUBSTATION SIGNALLING APPARATUS.

J. W. Mead, H. A. Mackie and Martin Van Buren, of Amsterdam, N. Y., patent (No. 764,139) and assign to M. Van Buren and J. J. Turner, of Amsterdam, N. Y., a telephone signalling apparatus. The object of this invention is to provide



a substation signalling apparatus which can be used in connection with local battery, and, at the same time, operate to signal the exchange by the simple removal of the receiver. The circuit is shown in the illustration, from which it appears that there is an induction coil *N* which is charged by means of the local battery *E*. There is also a contact breaker *P* in circuit with the primary of this coil. By operating the hook *B* a kick is produced in the line just sufficient to throw a drop or operate a relay.

PARTY LINE SYSTEM.

J. T. Fisk, of Adrian, Mich., patents (No. 763,972) and assigns to George P. Fisher, Jr., of Chicago, Ill., a party line system. This is a patent for a selective system applicable to party lines. The invention is based upon the use of the step by step mechanism, but is so complicated that it requires seven sheets of drawings and fourteen sheets of specifications and it is impractical to describe it in our limited space. Those who are interested therein will do well to obtain a copy of the original patent.

RINGING SYSTEM FOR TELEPHONE SIGNALLING.

T. C. Drake, of Malta, Ohio, patents (No. 763,971). The object of this invention is to provide an improved method for signalling substations so that the operation of ringing may simultaneously actuate the cut-off relay and thus expedite the making of connections. The general features of the system are shown in Figs 1. and 2, which are skeleton diagrams showing the ringer *c* at the substation, a line *c2* across which there is a relay *c3*, the central office being represented by a battery *c4* and a ringing

Fig. 1

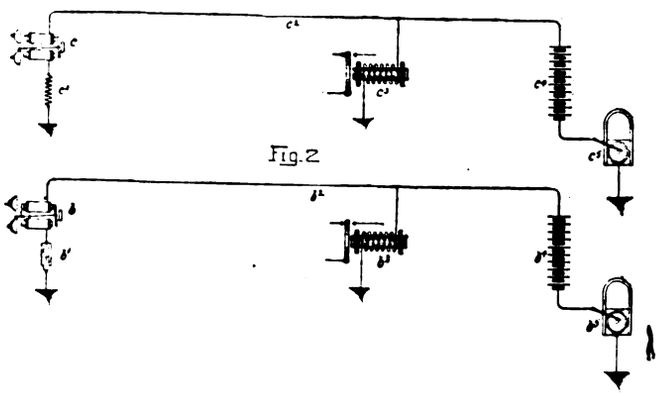


Fig. 2

generator *c5*. These diagrams show grounded lines, but a metallic circuit may be substituted for the ground. The essentials of the invention lie in the placing of the generator in series with the battery and so adjusting the relay between the spring of the battery, the resistance of the relay *c3* and of the resistance *c1* at the substation so that the battery may not be able to actuate the relay. When the ringing generator is operated sufficient current flows to draw up the relay armature and then the battery current holds it in place. A condenser may be substituted for the resistance *c'*, as is shown in Fig. 2.

IMPROVED HOOK-SWITCH.

A. B. Chance, of Centralia, Mo., patents (No. 763,464) an improved hook-switch. The object of this device is to provide a hook-switch so contrived that when the hook-switch rises it shall send to the central office a calling signal, and when it is depressed by the operator a disconnect signal will be sent. This is achieved by providing the switch with two springs which are operated by means of a pin on each side, one spring sending the calling signal and the other the disconnect signal.

IMPROVED TRANSMITTER.

A. J. Mundy, of Boston, and A. E. Smith, of Waltham, Mass., patent (No. 763,501) an improved telephone transmitter. The essential features of this device consist in filing the surface of the carbon electrodes of the transmitter with semi-circular grooves into which small rods of carbon, preferably lamp films, are placed, which form the microphonic contacts.

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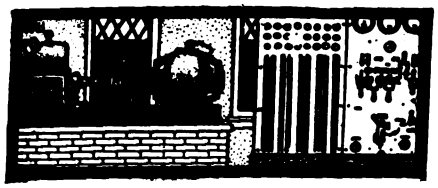
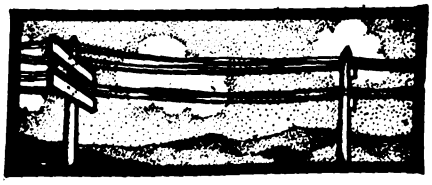


QUERIES

Questions on any subject relating to telephony will be answered on this page.



ALTERNATING RELAYS.—(383.)

Can you give a description of a relay that will operate on alternating current and not chatter so as to cut out the contacts operated by the armature? H. M. R.

The relay, as shown in Fig. 383a, will operate on alternating current without chattering of the contacts. This is due to the mass of the armature, which is made heavy, and therefore tends to remain in its upper position when current once operates it. A thousand ohm relay made similar to the above, having 14,500 turns of No. 36 copper wire, will operate at 75 volts, alternating

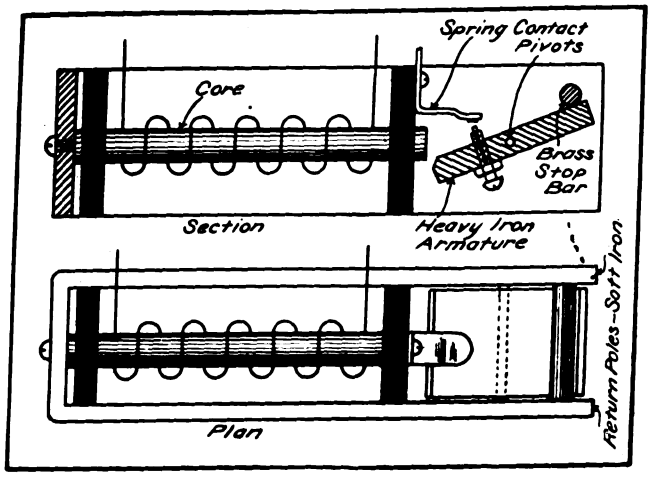


Fig. 383a.

current through 17,000 ohms and a two microfarad condenser in series; furthermore, it will not stick when its resistance is reduced to zero.

In Fig. 383b another type of relay is illustrated which will operate on alternating current without chattering at the contacts. Two coils are used, one receiving the line current direct and the other through the condenser. The condenser causes the alternating current to lead in phase so that whilst the current in coil *A* is neutral there is enough in coil *B* to retain the armature in its upper position.

BRIDGING TELEPHONES.—(384.)

Is it practical to have 10 bridging telephones on one grounded line when the ringers are only wound to 1000 ohms resistance and the line about 10 miles long? P. M.

It is our opinion that it is not practical to place 10 bridging telephones on a grounded line. The reason for this is twofold: In the first place, the resistance across the line in parallel is very low, being only 100 ohms. The line being 10 miles in length, the instruments nearest the exchange would receive a much larger amount of current than would those furthest away, consequently it is doubtful whether the instruments at the furthest end would ring at all satisfactorily, especially if the lines are iron wire. In the second place, grounded circuits, according to modern telephone practice, are undesirable, however, in country districts, where are there no disturbing influences, such as trolley or electric light lines, they can be used with a fair degree of success, the great trouble is cross talk. We would certainly advise, if practical, to put in another wire and make the circuit metallic, because under these conditions it is much easier to locate and clear trouble, and at the same time the service will be improved, and cross talk can be gotten rid of entirely by suitable transpositions.

TIME TO ANSWER.—(385.)

What is the average time for operators to answer on a magneto board? B. S. B.

It is impossible to give any average time required for operators to answer upon a magneto switchboard, because the time consumed will vary with the type of board and with the training of the operators. Thus, on a board equipped with automatic self-restoring drops, answering will be quicker than upon a board having mechanical drops, while the mechanical drop will be quicker than the old-fashioned drops in which each drop must be restored by the operator by hand. About seven seconds would be considered fair time, five seconds quick time, and ten seconds slow time.

GERMAN MANUFACTURERS.—(386.)

Will you please tell me the name of the maker of the German telephones described in your issue of June 25th. Q. N.

The telephone apparatus described is made by the firm of Mix & Genest, of Hamburg, Germany.

NOISY TRUNK LINES.—(387.)

We have two trunk lines entering our exchange, one of whcih is 25 miles in length and the other one only 4. Both trunks when connected to subscribers are quiet, but when connected together the circuit becomes very noisy. We have gone over all the connections and tested for grounds without finding any trouble. Can you suggest any reason for this phenomenon and also the cure?

The trouble of which you speak is one that is fairly common. The first remedy we would suggest is that you transpose both circuits. If this has already been done there is every reason to suppose that the noise is brought on by the short line connecting with the long one. Again, the long line may run through the country where there is no disturbance, whereas the short line may parallel or run near to trolley circuits. If this is the case, the inductive effect due to these causes may not be noticed on local connections with the short trunk while, when the short trunk line is connected to the long one, the inductive disturbance is extended throughout its whole length and would, of course,

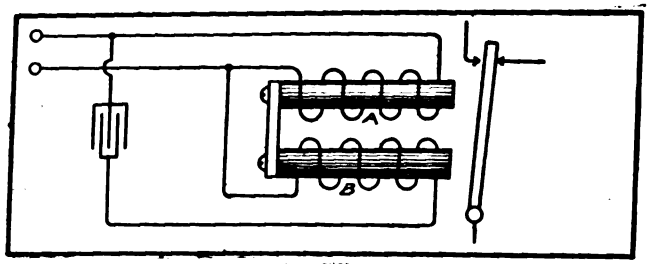


Fig. 383b.

cause the trouble you speak of. The resistance of both sides of the circuit should be found, and if there is any difference it should be remedied at once. One method of overcoming the difficulty of unbalanced connections betwen the trunks is to insert repeating coils, but this is not advocated except under exceptional conditions, as the insertion of the coil, although it may reduce the noise, at the same time, it will reduce the volume of sound, which is transmitted.

RESISTANCE OF BELLS.—(388.)

What resistance of magneto bells would be most satisfactory on a 20 party line ten miles long?

A 1600 ohm bell would be proportionate for the line mentioned.

BUILDING LINES.—(389.)

Our manager is putting up 12 miles of metallic circuit line. He says he will go over the line and transpose after the circuit is completed. Is this a good way to construct a metallic circuit? K. T. S.

Metallic circuit lines are invariably constructed this way, as it is impractical to make any transpositions at the time the line is being built, since the exact locations for the transpositions are not known and the amount of transposition necessary to clear the line of cross talk or inductive effects cannot be determined until the line has been built.

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THE WEEK'S MESSAGES

FINANCIAL.

VALPARAISO, CHILE.—The annual report of the Chile Telephone Company showed a gross revenue of $916,542, an increase of $75,349. The expenditures were $422,409, an increase of $20,890. The net income from all sources was $494,133, an increase of $54,459.

DARLINGTON, ILL.—The Darlington Telephone Company has increased its capital stock from $1,000 to $10,000. The president of the company is Daniel Lewis.

BROWNSVILLE, IND.—The Brownsville Co-operative Telephone Company, of which W. H. Hawkins is president, has increased its capital stock from $2,000 to $5,000.

FRANKLIN, IND.—The Franklin Telephone Company has increased its capitalization to $5,000. Frank F. Smith is president of the company.

ADAMSVILLE, O.—The Adamsville Telephone Company has increased its capital stock from $10,000 to $30,000.

DAYTON, O.—A meeting of the stockholders of the Home Telephone Company will be held at the offices on the 12th day of August, 1904, at 2 o'clock P. M., for the purpose of considering and acting upon a resolution to increase the capital stock of the company from $1,000,000 to $1,200,000.

NEWARK, O.—The Newark Telephone Company has declared a dividend of 3 per cent. on its preferred stock.

PHILADELPHIA, PA.—The quarterly earnings of the Keystone Telephone Company for the period ending June 30 of this year, abounted to $86,240 against $53,787 for the corresponding quarter of last year.

PARKERSBURG, W. VA.—The West Virginia Western Telephone Company has purchased the plant of the Marietta Telephone Company, which it will absorb. The purchase price is stated to be in the neighborhood of $80,000.

FRANCHISES.

EVANSVILLE, IND.—The Evansville Home Telephone Company has asked for a franchise, the notable feature of which is that the company will deposit $3,500 with the city within ten days after the franchise is signed, this amount to be forfeited to the city if the actual construction is not begun within sixty days. Aerial lines are to be strung and an underground system is to be used in the down town section.

SOLA, KANS.—Arnitt & Hobartt, owners of the Sola Telephone Company, have secured a franchise at Greeley, Kans., for a telephone system, and will commence construction work as soon as material arrives. They have sixty subscribers to start with.

MIDDLEBORO, MASS.—A franchise has been granted to the Southern Massachusetts Telephone Company.

ASBURY PARK, N. J.—E. H. Snedeker, of New York, has asked the city council for a franchise to construct a telephone system at Asbury Park.

CLEVELAND, O.—A franchcise has been granted the United States Telephone Company to operate in Cincinnati. The exchange will be ready for service next September.

DAYTON, O.—The Middletown Telephone Company has applied for a franchise in Middletown. The company is capitalized at $10,000. Of this amount $10,000 has been subscribed and $100 of the amount has been paid in.

READING, O.—The Queen City Telephone Company has applied for a franchise to operate a telephone system in this village.

SUMAS, WASH.—J. H. Lochbaum and associates are petitioning the city council for a franchise to construct and maintain a telephone system.

POUND, WIS.—The Farmers & Merchants Telephone Company has been granted a franchcise by the town council to build a telephone line through the town.

COMBINATIONS.

MORAN, KANS.—The Moran Telephone Company has sold its exchange at Moran to J. J. Wilson. Mr. Wilson will make extensive improvements.

SALINA, KANS.—The Salina Telephone Company has sold that part of its toll line running between Sincola and Plainville to O. O. Spencer, of Wilson, Geo. Tolivar, of Lucas, and others.

SALINA, KANS.—The Salina Telephone Company has purchased the exchanges at Lindsberg and Marquette, along with 180 miles of toll line, running from Salina and Gypsum to Bushton.

EAST AURORA, N. Y.—The Haines Telephone Company has sold out its plant here to the Inter-Ocean Company. The new company has planned many changes and will spend considerable money in perfecting and extending the system.

LE ROY, N. Y.—The Pavilion exchange of the Home Telephone Company is soon to be combined with the Le Roy exchange. This will enable Pavilion subscribers to talk with Le Roy subscribers without paying extra toll rates.

HONESDALE, PA.—The Honesdale Telephone Company now has complete control of the Citizens' Telephone Company. Connections with Milanville, Carbondale, Scranton, Wilkesbarre, Rawley, White Mills, and other cities will soon be made.

ELECTIONS.

SANTA ROSA, CAL.—At the meeting of the Farmers Fulton Telephone Company No. 2, the following officers were elected: J. Eckel, president; John Faught, vice-president; James Wood, secretary and treasurer.

MONTREAL, CANADA.—The Canadian Telephone Company held its annual meeting recently and elected the following officers: G. G. Hurd, president; A. Adam, vice-president; A. G. Hurd, secretary and treasurer; W. T. Aoughtred and Joseph Lemieux, managers.

ALTON, ILL.—The Fosterburg-Wood River Telephone Company elected the following directors: Edmund Beall, D. M. Kittenger, J. P. King, W. H. Cartwright, J. S. Culp, and others.

MONMOUTH, ILL.—At the annual meeting of the stockholders of the Monmouth Telephone Company the following officers were elected: C. C. McClung, president; J. E. Lanphere, vice-president; H .B. Smith, treasurer; W. A. McQuiston, manager and secretary.

SHOALS, IND.—At the annual meeting of the Shoals, Indian Springs and Bedford Telephone Company the following officers were elected: Garret McDermed, vice-president; Capt. Monicle, president; Walter Jones, secretary, and William Mitchell, treasurer. J. N. Sims, M. Dillman, A. A. Thompson, C. Henshaw, B. S. Stapleton and William McCane, directors.

LA FAYETTE, IND.—At a meeting of the stockholders of the Hoosier Telephone Company the following directors were elected: Homer Fisher, Orleans; M. B. Hottel, L. G. Davis, W. H. Rudder, Salem; J. T. Stout, Paoli; John Stratton, Campbellsburg, and G. M. Morris, Canton.

MT. PLEASANT, IA.—At the annual meeting of the Mt. Pleasant Telephone Company the following officers were elected: W. J. Steckel, president; R. S. Galer, vice-president; E. E. England, secretary. A dividend of 5 per cent. was declared on the preferred stock.

MUSKEGON, MICH.—The Citizens Telephone Company of Muskegon held its annual meeting and elected the following officers: Thomas Hume, president; Dr. B. D. King, vice-president; L. B. Smith, treasurer; H. H. Mann, secretary, and William Robinson, manager.

WINDOM, MINN.—At a recent meeting of the Mutual Telephone Company the following officers were elected: H. E. Hanson, president; D. U. Weld, vice-president; J. J. Rupp, secretary, and Henry Sherman, treasurer.

WAKONDA, S. D.—At the annual meeting of the stockholders of the Wakonda Telephone Company, the following officers were elected: M. J. Chaney, president; F. A. Swezy, vice-president; Samual Jacobson, secretary, and L. O. Northrup, treasurer. Plans are being made for the extension of the local telephone system.

WEAKLEY, TENN.—At a meeting of the stockholders of the Weakley Telephone Company the following officers were elected: Hon. G. E. Bowden, president; T. H. Farmer, vice-president; R. W. Martin, secretary; T. H. Farmer, J. M. Gardener, F. J. Burchard, R. W. Martin, and Dr. D. W. Scotis, directors.

VIRGILINA, VA.—At the annual meeting of the Virgilina Telephone Company, the following officers were re-elected: E. Davis, president; W. W. Tuck, general manager; J. B. Wilborn, secretary and treasurer.

MISCELLANEOUS.

VALPARAISO, CHILE.—At the annual meeting of the directors of the Chile Telephone Company it was stated that there were 5,814 subscribers, a gain of 443 for the year.

IOLA, KANS.—The Iola Telephone Company will pay the city $300, which is 3 per cent. of its gross receipts for the past six months, for its franchise privilege.

HOPKINSVILLE, KY.—The Hopkinsville Home Telephone Company has completed its plant. The corporation has secured the city contracts to the exclusion of the Bell Company.

JIMIRIZ, STATE OF CHIHUAHUA, MEX.—The contract for a telephone system here has been let to Weisil & Kok, of Parral, Mexico.

ST. LOUIS, MO.—J. B. HOGE will attend a meeting of Independent telephone men who are working out the long distance problem. When the plan is completed the Independents will have long distance service to all of the principal points between Cumberland, Maryland, and Topeka, Kansas.

HASTINGS, NEB.—The Glenville-Inland Telephone line now has connection with other Independent lines whereby every town in the county can be reached.

NIAGARA FALLS, N. Y.—The Home Telephone Company will expend between $35,000 and $40,000 in improving the local service. A new exchange station will be built and the latest improvements will be installed.

CLEVELAND, O.—The United States Telephone Company has increased the wages of its fifty operators 10 per cent.

DENISON, TEX.—The Grayson County Telephone Company's exchange was damaged by fire to the extent of several hundred dollars recently.

FRANKLIN, TEX.—Mr. H. A. Hoges, of this place, has bought out the local telephone exchange.

SEARCY, TEX.—Mr. A. J. Searcy, of this place, has just put its line in good order.

OSHKOSH, WIS.—The Wisconsin Telephone Company had about 150 telephones burned out during a recent storm.

NEW COMPANY NOTES.

COLUMBIANA, ALA.—The White and Davis Telephone Company has been incorporated with a capital stock of $10,000 by J. R. White, W. S. Davis, W. P. White and others.

BELLAIR, ILL.—The Bellair Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are: L. M. Biggs, J. E. Farley, E. M. Wyman.

CHICAGO, ILL.—The Cedarville Home Telephone Company has been incorporated with a capital stock of $7,000, the place of operation not given, by H. M. Fisk and S. F. Newhall, of the Fisk-Newhall Telephone Manufacturing Company, and S. W. Roberts.

SHELBYVILLE, ILL.—The Rose Township Telephone Company has been incorporated with a capital stock of $1,020, the incorporators being: Philip Roessler, George Ruff, Jacob Kull.

TAYLORVILLE, ILL.—The Taylorville Home Telegraph & Telephone Company has been incorporated with a capital stock of $75,000. The incorporators are: Henry W. Carter, George E. Waldo, C. M. Smith.

FRANKLIN, IND.—The Farmers & Citizens' Telephone Company has

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been incorporated with a capital stock of $10,000. The principal incorporator is E. H. Phillips.

TALMA, IND.—The Talma Telephone Company has been incorporated with a capital stock of $5,000, by S. J. Grove, Lou Grove and Omar Montgomery.

COUNCIL BLUFFS, IA.—There are good prospects for an Independent company in Council Bluffs.

SCRANTON, IA.—The Farmers' Mutual Telephone Company, of Scranton has been incorporated with a capital stock of $10,000 by the following directors: E. E. Foy, N. E. Christian, John Eldred, John Page, W. B. Robson.

SLOAN, IA.—The People's Telephone Company has been incorporated with a capital stock of $15,000.

STOCKPORT, IA.—The Farmers' Mutual Telephone Company, of Stockport, has been incorporated with a capital stock of $10,000, and the following officers: James M. Martin, president; R. M. Harlan, vice-president; Delbert Morris, secretary; Wilson C. Lane, treasurer.

RANDOLPH, KY.—The Randolph and Hiserville Telephone Company has been chartered by L. B. Strader, J. H. Owen and E. Evans.

CLARKFIELD, MINN.—The Clarkfield Telephone Company has been incorporated with a capital of $3,000. The directors are: J. N. Silver, G. J. Piersol, W. B. Torgerson, J. H. Lynner, J. Larson, E. Monson and A. J. Johnson.

FAIRFAX, MINN.—The Fairfax Telephone Company has filed articles of incorporation with a capital stock of $10,000.

SENATOBIA, MISS.—The Tate County Telephone Company has been chartered here. J. F. Brewer, F. M. Bizzell and others are the incorporators.

ST. JOSEPH, MO.—The Funston Long Distance Telephone Company, of St. Joseph, has filed articles of incorporation with a capital stock of $15,000.

CASCADE, MONT.—The Cascade County Rural Telephone Company will be incorporated with a capital stock of $50,000. The following officers were elected to act until after the incorporation of the company: Cuno Jaecket, president; Duncan Cameron, vice-president; John Mainland, second vice-president; W. F. Kester, third vice-president; W. A. Doyle, secretary, and E. B. Judd, treasurer.

BURDETT, N. Y.—The Burdett Home Telephone Company has been incorporated with a capital stock of $5,000 by H. R. Martin, M. L. Martin and S. B. Allen.

WEYBURN, N. W. T.—The Weyburn Telephone Company has been organized by Messrs. Oscarson and Simpson, to construct a telephone system at Weyburn, and extending to Regina.

DEXTER CITY, O.—The Dexter City Southwestern Telephone Company has been incorporated with a capital stock of $10,000 by B. F. Worrall, Adam Shriver, G. W. Hutchinson, J. B. Hutcheson and L. D. Headley.

ORRVILLE, O.—The Gemmill Telephone and Manufacturing Company, of Orrville, has been incorporated with a capital stock of $60,000 by James Gemmill, Thomas Dunlap and others.

WINDSOR, O.—The Windsor & Okaw Mutual Telephone Company has been incorporated with a capital stock of $900. The incorporators are: John W. Herron, J. H. Haste, J. F. Morse.

FREDERICK, OKLA.—The Southern Oklahoma Farmers' Telephone Company has been chartered. The incorporators are: C. A. Smith and J. O. West, of Frederick; L. A. McConnell and A. Kohle, of Elmer, and B. F. Flower, of Asiatic.

OKLAHOMA CITY, OKLA.—The Conway Telephone Company has been incorporated.

TRYON, OKLA.—The Lincoln County Rural Telephone Company has been incorporated with a capital stock of $5,000 by T. D. Rush, J. N. Smith and A. G. Walters, of Tryon, and William Teegarden and G. W. Howerton, of Carhey.

PRINEVILLE, ORE.—The Central Oregon Telephone Company has been incorporated here by A. L. Goodwillie and W. E. Guerin.

BETHEL, PA.—The Bethel Telephone Company has been incorporated with a capital of $5,000. Treasurer, Wm. F. Hammel, Finleyville. Directors: Wm. T. Phillips, James P. Wilson, Wm. F. Hammel, John Simmons, J. J. Snyder, James G. Holleran, Bethel township; Samuel F. Boyer, W. J. Anderson, Union township; O. C. Simmons, W. P. Simmons, Snowden township; Adolph Steding, Pittsburgh.

BROOKVILLE, PA.—The Red Bank Telephone Company has been incorporated with a capital stock of $10,000.

FINLEYVILLE, PA.—The Bethel Telephone Company has been incorporated with a capital stock of $5,000, by W. T. Phillips, J. P. Wilson, S. F. Hamill, John Simmons, J. J. Snyder, and others.

CONWAY, S. C.—A charter has been issued to the Conway Telephone Company. The capital is to be $3,000 and the company proposes to establish a telephone line between Conway and Marion. The officers are: R. B. Scarborough, president; H. P. Little, vice-president, and C. E. St. Amand, secretary.

LEXINGTON, S. C.—The Lexington Telephone Company has been incorporated with a capital stock of $1,000 by J. E. Kaughman and A. J. Fox.

WHEELOCK, TEX.—A new company has been formed here with J. B. Dunn, president; W. Curry, R. Killough, John Dunn, J. B. Dunn, directors. New lines are being constructed and the latest improved telephones will be installed.

PERSONAL.

I. B. CARPENTER has been promoted to the position of superintendent of the Providence Telephone Company.

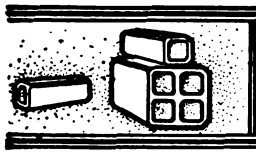
W. R. HARRIS, underground conduit designer and constructor, is now connected with the E. H. Abadie Company, Bank of Commerce Building, St. Louis, Mo. Mr. Harris will have charge of the company's construction department.

J. D. HOUSEMAN has been elected general manager of the St. Louis County Telephone Company, with headquarters at Clayton.

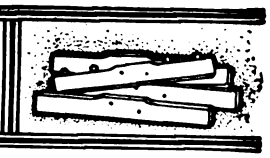
E. C. SHORE, late superintendent of construction for the Duluth Telephone Company, has been appointed superintendent of the Minnesota Telephone Company, and will have his headquarters at Minneapolis.

D. J. TOLMAN has resigned the managership of the Biddeford, Me., Telephone Company.

P. J. WEIRICH has been appointed manager of the Monroe Telephone Company, of Monroe, Wisconsin.



New Construction in the Field



BURBANK, CAL.—Work on the various local lines of the Home Telephone Company is progressing rapidly.

SAN DIEGO, CAL.—The Home Telephone Company is contemplating extensive additions to its service.

ST. JOHNS, N. B., CANADA.—The N. B. Telephone Company will erect a two-story building at St. Stephen.

DENVER, COLO.—The government will construct a telephone system to operate in conjunction with the Gunnison tunnel.

GLENWOOD SPRINGS, COLO.—The Colorado Telephone Company is spending $3,000 in putting in cable lines and erecting poles.

ROCKFORD, ILL.—Within the next two weeks the Home Telephone Company will have through connection through Beloit with the Badger State Telephone Company.

OTTUMWA, IA.—The Iowa Telephone Company will expend $80,000 in improvements at Ottumwa. A new building is included.

ROCK RAPIDS, IA.—A rural telephone line is being constructed between this town and Lester.

SIOUX CITY, IA.—The Sioux City Independent Telephone Company has purchased a site for its new exchange. The work on the building will be started shortly. The building will cost about $30,000.

BALDWIN, KANS.—Mr. Haas, of this city, will install a telephone system among the farmers at Worden township. He has 100 contracts to start with.

LINCOLN, KANS.—The Lincoln Telephone Company has installed a new 300-line switchboard, and is now in a position to take care of the increasing demand for rural telephones. It will build several new country lines at once.

PRESCOTT, KANS.—The farmers in this vicinity are extending their lines and will build a toll line to Mound City, Kans., as soon as poles can be secured.

TESCOTT, KANS.—The Tescott Telephone Company will build several rural lines in the near future. It has secured contracts from a great many farmers.

EVELETH, MINN.—The Missabe Telephone Company has been making extensive improvements to its system. The company has put in a new 100-line switchboard and lightning protector at Biwabik. An additional copper circuit is being constructed from Duluth to Hibbing for long distance calls.

WINDOM, MINN.—The Tri-State Telephone Company is extending its line from St. Paul to Winona. From Winona the system will be built west to Rochester, Owatonna and Mankato, connecting with the line to Worthington and Sioux Falls.

CLINTON, N. Y.—The Clinton Telephone Company will have its line in operation by the first of September. It is expected that the laying of conduits will be completed within six weeks.

FULTON, N. Y.—The Fulton Telephone Company has nearly completed its line between this city and Rochester. A new switchboard will soon be installed in the local office.

PENN YAN, N. Y.—The Crosby and Barrington Telephone Company will extend its line from the present terminal to Wayne via Keuka Landing. The work of extending the line will be commenced as soon as the material can be secured.

SAVONIA, N. Y.—At a recent meeting of the directors of the Campbell & Risingville Telephone Company, it was voted to put in four new lines between Campbell and Savona, and two between Campbell and Coopers.

UTICA, N. Y.—The construction work on the Independent long distance line is progressing rapidly. The new line will be connected with the Interstate telephone line here.

WHEELER, N. Y.—The Wheeler & Kanona Telephone Company is extending its system and is building a line to Prattsburg.

EDINBURG, N. D.—A telephone line has been projected from Gardar to this town. Hon. E. H. Bergman is president of the company.

GRAND FORKS, N. D.—The Tri-State Telephone Company is installing a first-class up-to-date telephone exchange in Grand Forks.

LITCHVILLE, N. D.—A telephone line is being built from Litchville to Marion.

MADISON, O.—The Madison Telephone Company has sold its Perry exchange to the Perry Company.

PRINEVILLE, ORE.—The Deschutes Telephone Company has begun the construction of a line to this place, which it is expected will be in operation by September.

FRANKLIN, PA.—The Citizens Home Telephone Company is preparing to extend its line. Some new cable construction is also contemplated.

MORRISON'S COVE, PA.—Work on the new telephone lines from Morrison's Cove has been begun. It is thought that the poles will be set by August 1st. It is further believed that by January 1, 1905, the line will be completed to Altoona.

PALMYRA, PA.—The Pennsylvania Telephone Company is installing a modern automatic telephone exchange at Palmyra.

POTTSVILLE, PA.—The Pennsylvania Telephone Company has presented an application for the right of way to run its wires through the borough.

READING, PA.—The Pennsylvania Telephone Company is extending its system in all directions from this city.

DEADWOOD, S. D.—The Home Telephone Company is rapidly getting its lines into shape, many of them being completed. General Manager C. Dunseth is very pleased with the number of new subscribers added since he took charge, many of the old patrons having returned. The line to Spearfish is completed; many new subscribers have been added. The Sturges line is working in first-class shape, and as soon as the Belle Fourch line is completed, the Sturges subscribers will be able to get connection.

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TRADE NOTES

THE F. BISSELL COMPANY, of Toledo, Ohio, has placed on the market a new grade of flame-proof wire, under the heading of "Security." The insulation of this wire is absolutely non-inflammable, a feature much desired for this class of wire. The company will be pleased to send a sample upon request.

THE NATIONAL WIRE CORPORATION, of New Haven, will move its general and executive offices on August 1st to the Engineering Building, No. 114 Liberty street, New York. On and after the above date all communications should be addressed to the New York office, where the company will continue to give all inquiries, orders and correspondence prompt attention.

THE VOUGHT-BERGER COMPANY, of La Crosse, Wis., has issued a novel advertising folder in the form of a reply postal card. The desirability of the pendent for all purposes is set forth, besides a thorough description of the apparatus. On the reply half of the card is an order blank with prices of the various types of instruments. This card is to be used in sending for a trial instrument subject to 30 days' time for demonstration as to its practicability.

THE HARVARD ELECTRIC COMPANY, of 62 W. Van Buren street, Chicago, Ill., has an office at 136 Liberty street, New York, in charge of Mr. J. J. Waldman. A large stock of Harvard protectors and specialties is carried, enabling Mr. Waldman to fill all orders promptly. Parties visiting New York should call at this office and make it their headquarters. Visitors may have their mail addressed here, and Mr. Waldman will extend all the courtesy necessary to make their stay agreeable.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, of Buffalo, N. Y., is building a multiple switchboard that is entirely new in many of its features. The switchboard is especially adapted to exchanges where floor space is limited. The construction is of iron and the boards are built of one position units. The cabinet contains the line and supervisory relays and condensers, also the main and intermediate distributing frames, there being room for a man to work conveniently inside the switchboard. All wiring and apparatus is so arranged that inspection can be made very readily.

THE DOUBLEDAY-HILL ELECTRIC COMPANY, of Pittsburg, Pa., has just issued the largest catalogue of electrical supplies ever put out. It contains 1,068 pages and is closely packed with interesting matter from cover to cover. A large section of the catalogue is devoted to telephone specialties, and this section is so arranged that operating companies find all their needs, no matter of what character, catalogued in a compact yet comprehensive form. Unlike some of the other supply houses, the Doubleday-Hill Company does not issue its telephone section in the shape of a separate catalogue, as the house argues that there is hardly an item in electrical equipment in which the telephone operator is not more or less interested. The entire catalogue is therefore sent on request. This huge volume is a fair index of the rate at which the business of Doubleday, Hill & Company is growing. The main reason for their growth is undoubtedly to be found in the unusual facilities they have for handling business at rock bottom prices. They handle the total output of a crossarm factory, and control also a pin and bracket factory. In other lines they have similar advantages, so that they have ready for immediate shipment the largest stock of general construction material of any house in the country. Pittsburg being the center of the brace and bolt trade, Doubleday, Hill & Company have, of course, command of a close and easy market in these lines, as they have in porcelain insulators, the making of which also centers in Pittsburg. Altogether the house has exceptional facilities, and it is always ready to quote prices for quick shipment. Inquiries of every character are solicited and prompt attention to all communications is guaranteed.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—The Ottumwa Telephone Company's plant at Ottumwa, Iowa, including Franchise and all its property. The Company owns the three-story brick building, built two years ago, in which is installed a Central Energy System, equipped for 1,540 full metallic lines, with selective ringing apparatus, all of the latest and the best. 1,250 telephones are installed, with 250 names on the waiting list. The Company also owns 80 miles of toll lines. This is one of the best telephone propositions in the State of Iowa. For full particulars, maps and photographs, address the Citizens' Saving & Trust Company, Cleveland, Ohio, or Henry S. Herr, Ottumwa, Iowa. 187

EXCEPTIONAL BUSINESS OPENING.—Want to meet a man or syndicate that can invest $20,000 cash at once and can furnish credit promptly to the amount of $80,000 more in a telephone proposition near Kansas City, Mo., with or without service. Address—with reference, no agents—Theodore Gary, Macon, Mo. 207

FOR SALE—Switchboards and Telephones, all capacities and makes, Terminals, Cross-connecting Racks, Cable, &c., at less than half cost of new. Guaranteed reliable and efficient. Chicago Telephone Apparatus Exchange, 17 S. Elizabeth St., Chicago, Ill. 184

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

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HERE'S WHERE YOU GET THEM RIGHT!
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FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

POSITION wanted with telephone company in Colorado or Arizona. I have had three years' experience and am an expert lineman and repair man. References furnished. Address Box 206, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 206

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

POSITION WANTED as switchboard and instrument expert. First-class lineman. Nine years' experience. References furnished. F. E. Z., Box No. 8, Lisbon, Iowa. 217

UP-TO-DATE MANAGER, who has increased plant two and one-half times in two years, contract expires Sept. 1st, would like to change. Address Box 216, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 216

POSITION WANTED as superintendent or manager of any size exchange, magneto or common-battery, practical experience in all branches, best of references. Address P. O. BOX 690, St. Louis, Mo. 215

WANTED—Second-hand Telephone Apparatus, Central Energy and Magneto Switchboards, Telephones, Bridging Bells, Transmitters, Terminals, Cross-connecting and Distributing Racks, Ringing Generators. State details, price, condidtion and make. C. E. W., 17 S. Elizabeth St., Chicago, Ill. 188

POSITION WANTED—Telephone engineer, seven years' experience in manufacturing and operating companies, strictly temperate, honest and energetic, desires position as manager or wire chief. Good recommendations furnished. Address Box 213, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 213

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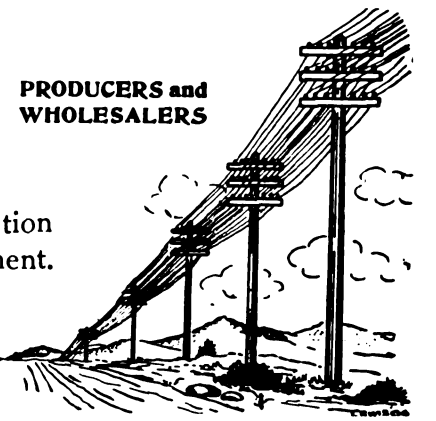

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If low prices, good stock and prompt shipment will get your business, it is ours.

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Fowler-Jacobs Co. **Elmore-Fowler-Jacobs Co.** **John H. Fowler & Co.**

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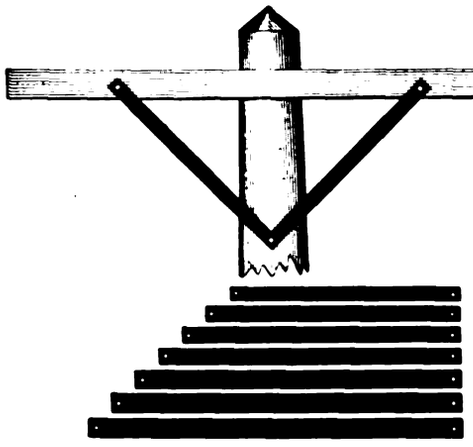

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OUR POLES ARE RIGHT

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A letter from you asking prices or other information will have the same prompt and courteous consideration that we would give an order for 100 carloads of poles.

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Highest Grade *Lowest Price* *Quickest Delivery*

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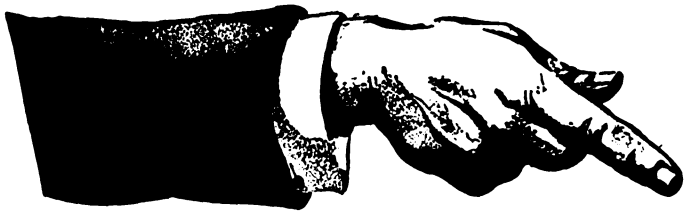

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The New "Tornquist" Combination Lightning Arrester, Ground Switch, Fuse and Lever Cut-out

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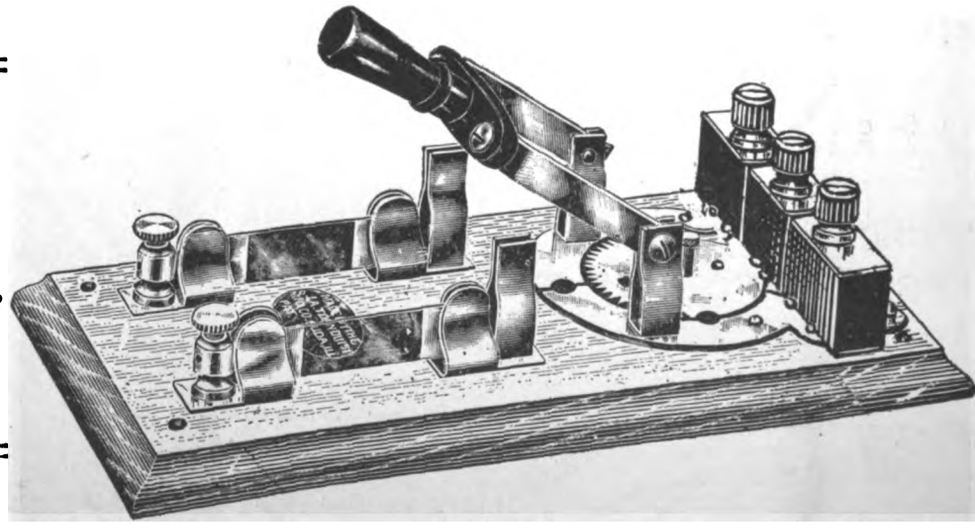

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POLE PRODUCERS.
We are producers and save you the jobbers' profit. That's why our prices are lowest. A trial order will convince you. Also that our ***White Cedar Poles*** are the finest in the land. Write for prices F. O. B. your town.

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Attractive Prices
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Locust and Oak Insulator Pins,
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A cussless, waitless, out-of-order-less
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See us at St. Louis,
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Thousands have already declared the Automatic Telephone the wonder of the Fair.

AUTOMATIC ELECTRIC COMPANY
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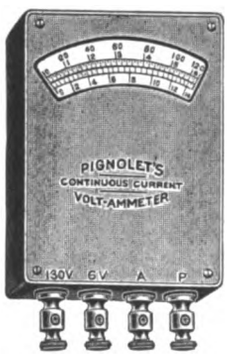

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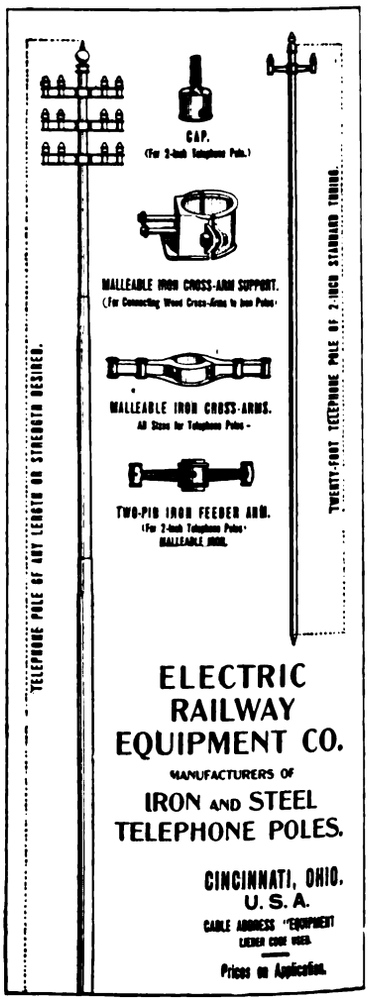

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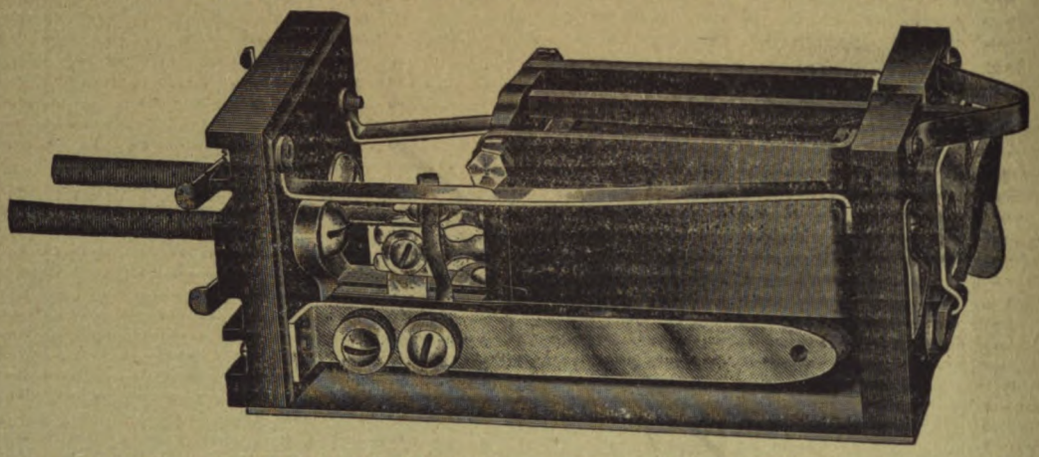

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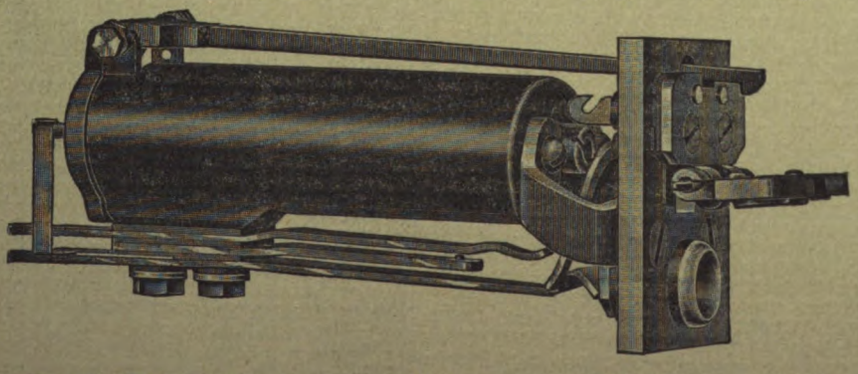

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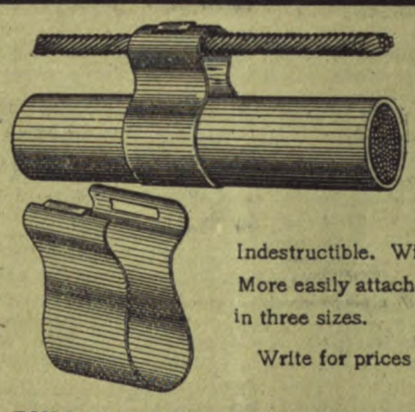

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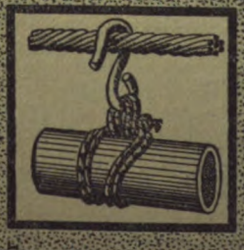

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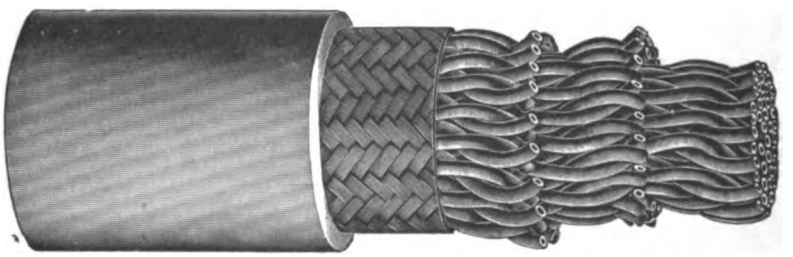

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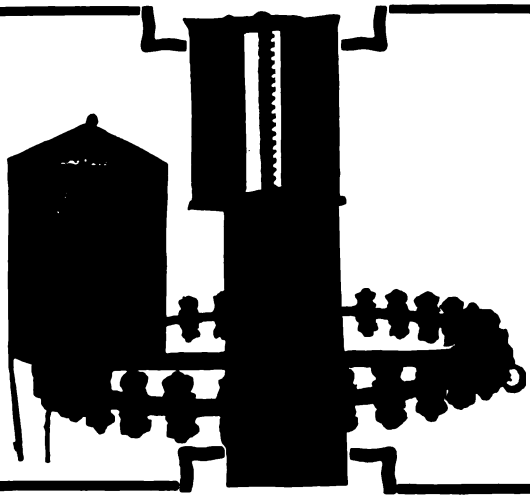

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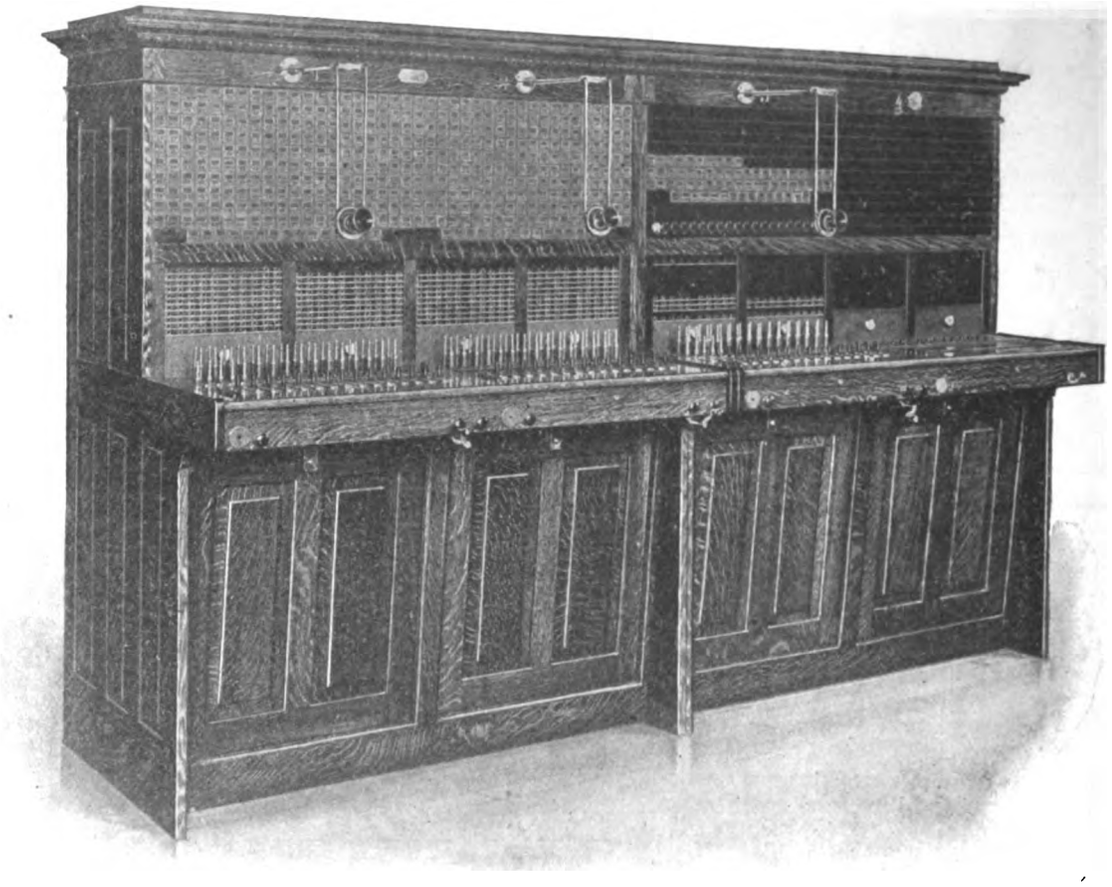

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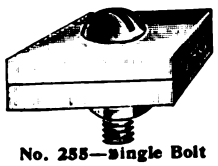

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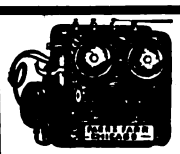

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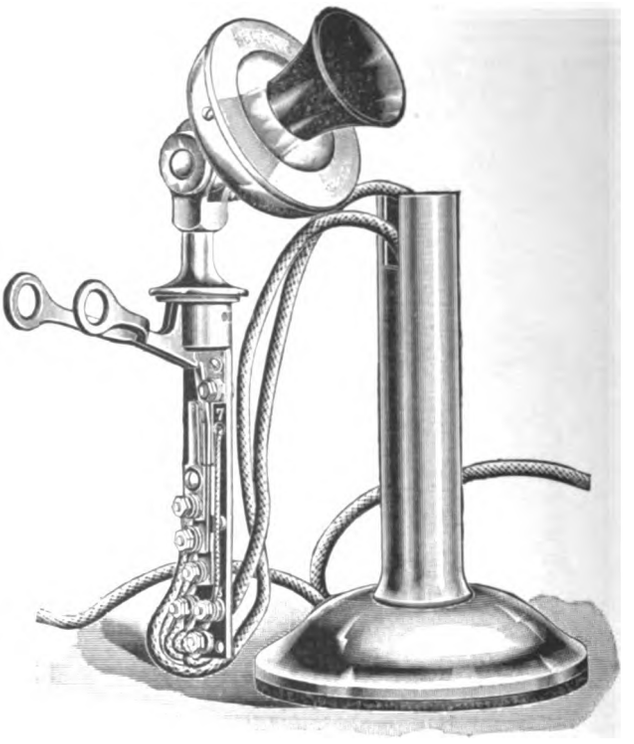

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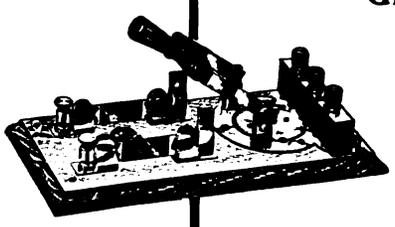

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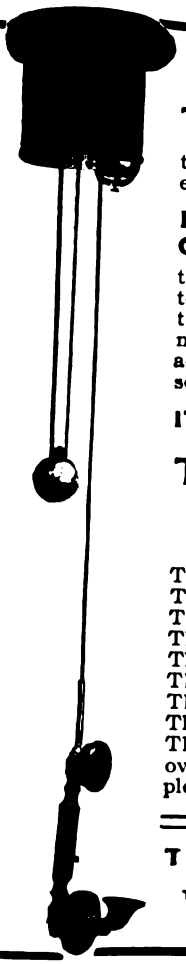

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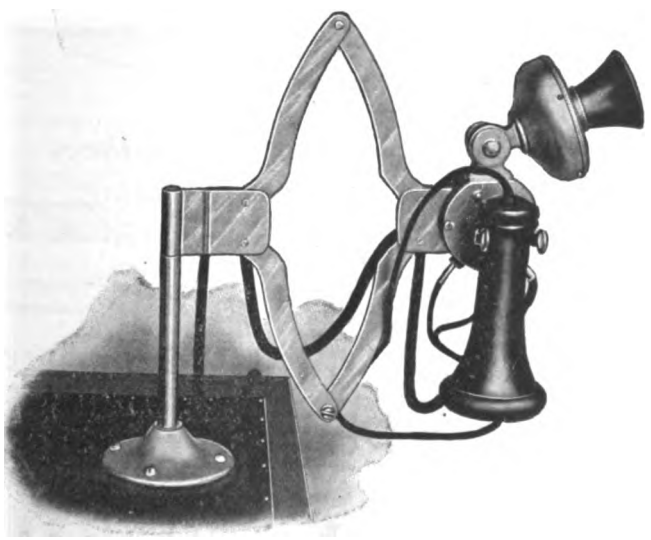

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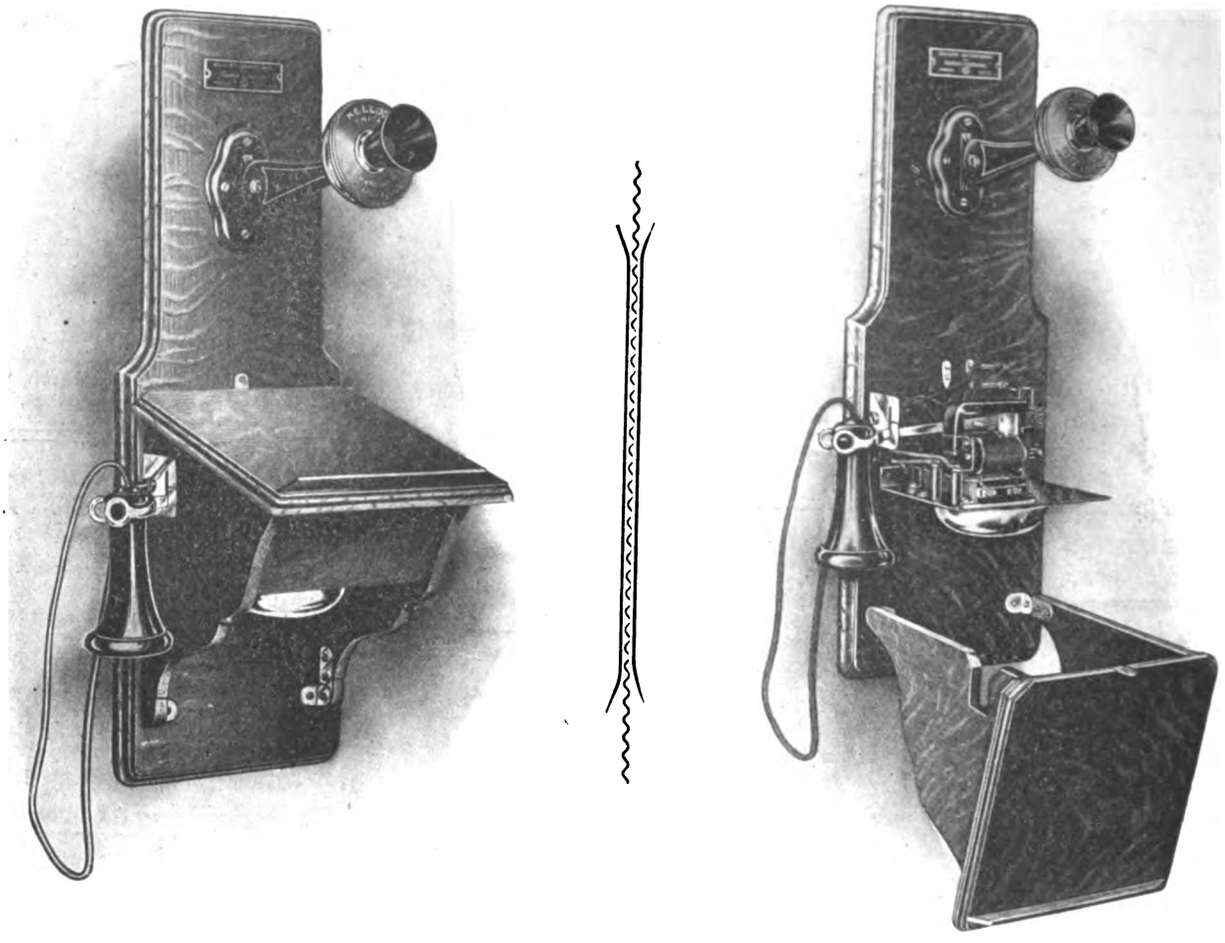

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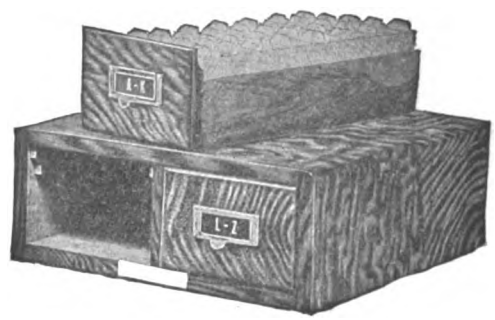

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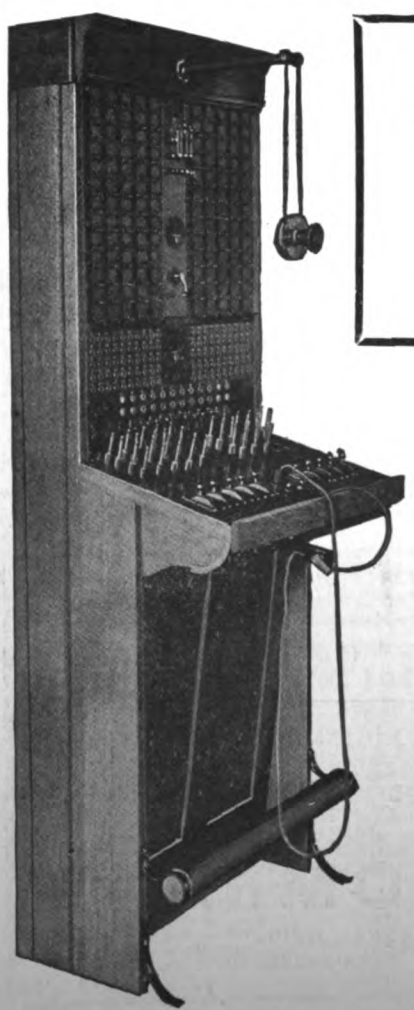

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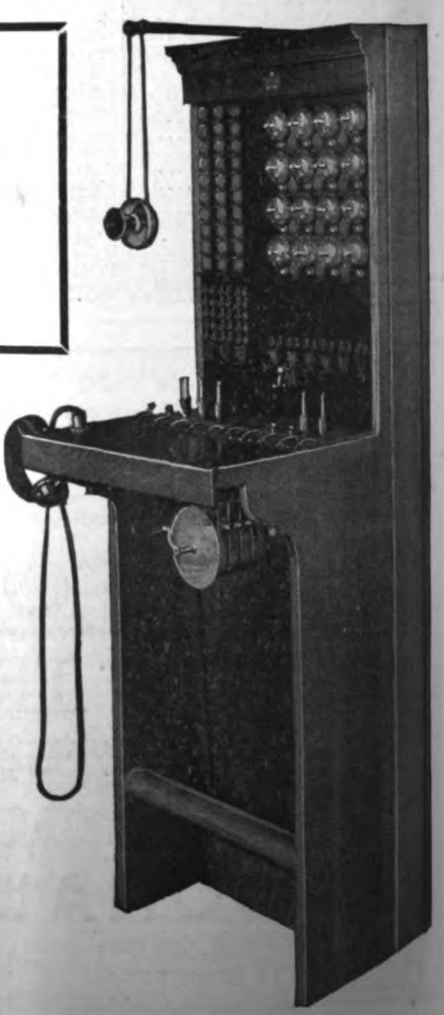

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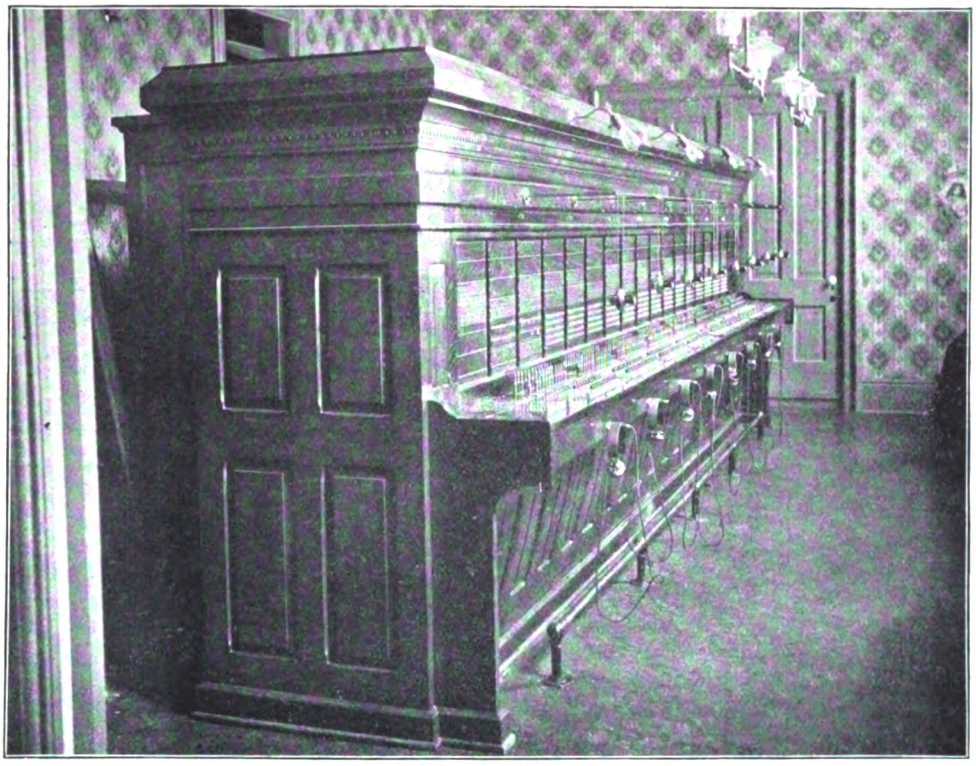

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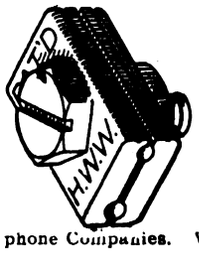

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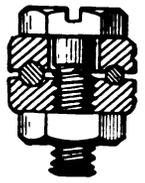

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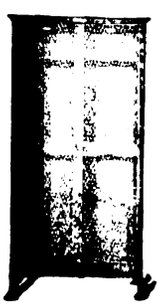

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VOLUME 10 SATURDAY, AUGUST 6, 1904 NUMBER 6

MULTIPLE CABLE DISTRIBUTION

By Edward A. Tyler.

ARTICLE I.

IN the designing and construction of a telephone system the part of the work needing the most consideration and the best judgment is the wire plant. Switchboards are switchboards, and no matter what the merits may be of the different types considered, whether magneto, central energy, or automatic, the main factors to be considered are cost and efficiency. But in the case of the wire plant there are numerous other conditions to be met and satisfactorily disposed of, which require a large amount of foresight and engineering skill.

There are the different methods of distribution to be considered by the engineer of a system, viz.: 1st, underground; 2d, open wire aerial; 3d, cable aerial. Besides these three divisions there are combinations of them which offer advantages under special conditions. Of these combinations it is the purpose of this article to treat with the one known as multiple cable distribution. Before proceeding, it must be understood that the following description is not the only method employed to attain the desired ends, nor is this article intended to champion the multiple method of distribution, but only to serve as an example. With these facts in mind, I will describe the general application of this system of distribution, starting first with its designation.

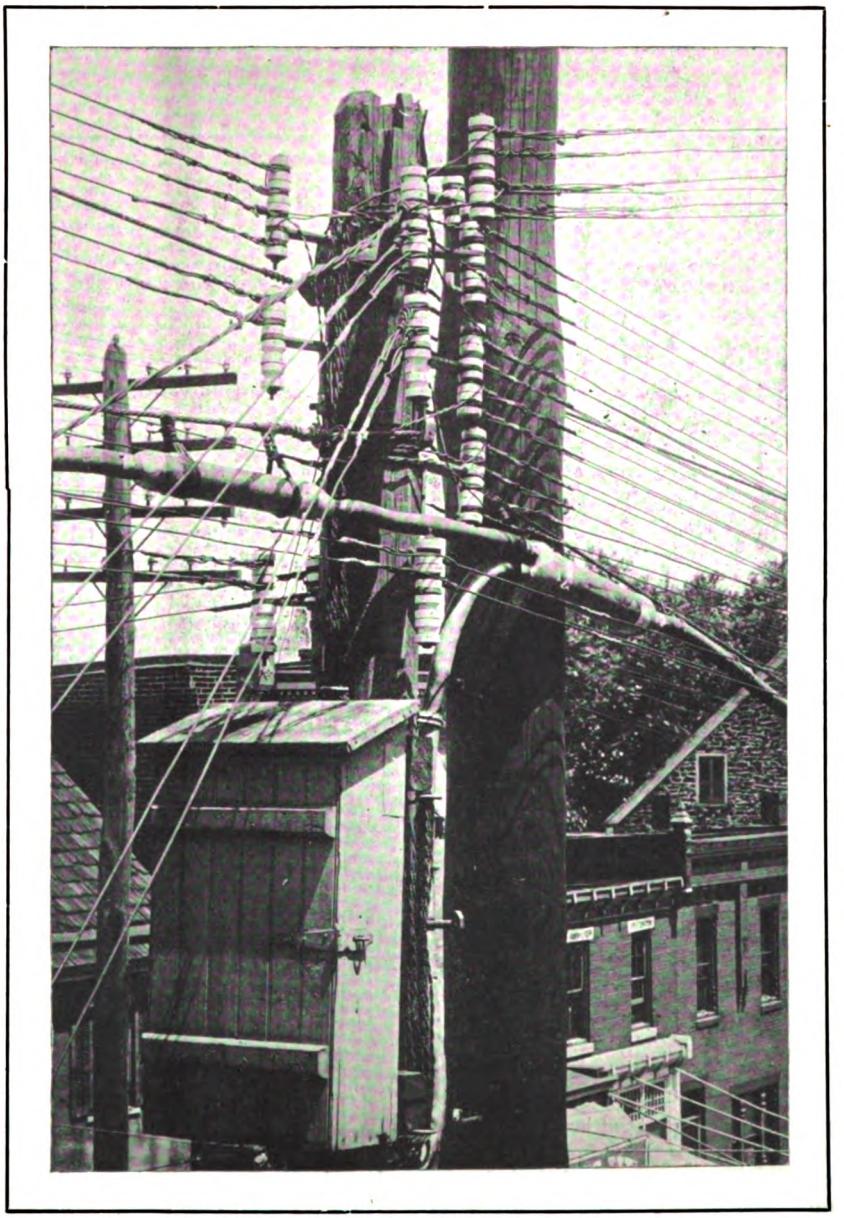

Fig. 1. Loop Pole.

Multiple cable distribution is a method of line construction in which the cable pairs of a system are available at different terminals, to provide for the constant and unforseeable change in location of substations and for the inevitable differences in estimated growth, which cannot be determined. The necessity for such a system depends entirely upon the class of service given, *i. e.*, whether it is to be private wire or party lines. It is obvious that in the case of direct or private wire service that there is less need for any circuit appearing at more than one terminal; whereas, in the case of party lines, the availability of a circuit at several points is much to be desired. As an illustration, Mr. A., whose line number is 861, moves to another street. In reconnecting his telephone, all that is necessary is to provide a new pair at the desired terminal and transfer the cross-connections of his line number on the main distributing frame from the old line conductors to the new ones. In this case it is evident that a multiple of the conductors used at the old terminal appearing at the new one would only be a waste of wire, since it would be dead, or in other words, unavailable for any other circuit.

Now let us consider the case from the party line standpoint. Mr. B., whose telephone number is 1326a, moves to another locality on the same loop line. If the terminal nearest to his new residence should have a multiple tap of the conductors used for his previous connection, he is able to retain his old number, whereas if there is no multiple, a new number will have to be assigned. Supposing, however, that multiple distribution is employed but that the old cable pair does

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not appear at this terminal. It may be found that there is a pair which appears at the terminals from which the service wires of the other parties on this line are taken off and which is not in use; then it is an easy matter to change the lines of all the parties to the new conductors and also to transfer the jumper on the main distributing frame to the new pair. Making this transfer is sometimes termed "making a drop," and will be gone into more fully later, since the great advantage of multiple distribution lies in the availability of pairs for making drops.

The general method of distribution employed in this system is

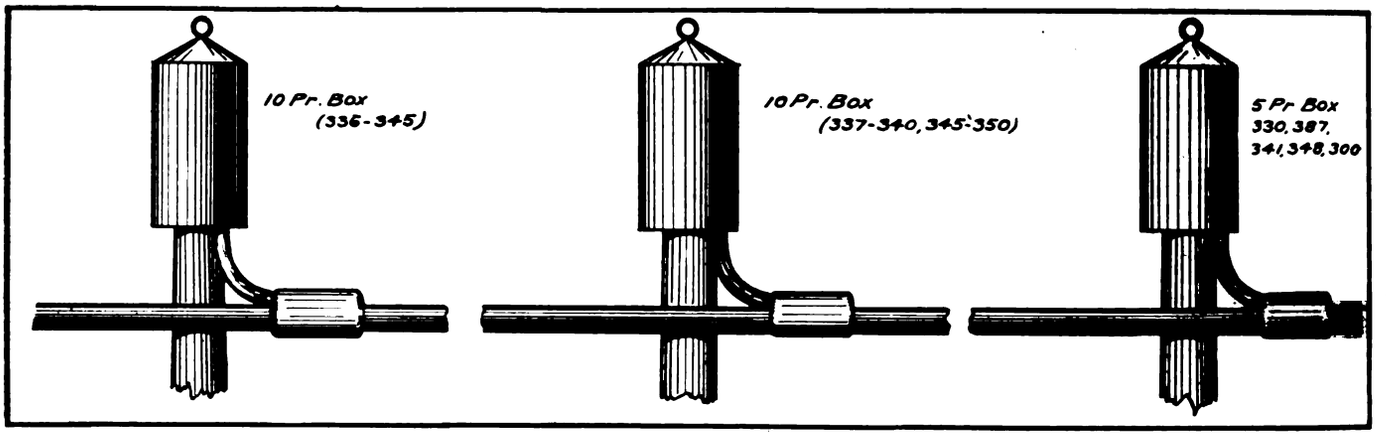

Fig. 2. Showing Method of Distribution.

a combination of aerial and underground cables, the underground cables bringing the lines from the exchange to what are termed loop poles, Fig. 1, the aerial cables forming the multiple distribution system. The loop poles are so termed because they are the terminal poles for the loop circuits. In general practice a pair in the underground cable only appears at one loop pole, it having been found that the maximum of efficiency in conjunction with economy of wire is thus attained. From the loop poles aerial cables are run off, and at specified intervals taps are made and certain pairs are taken off at distributing boxes, to which the subscriber's service wires are connected. In general the loop boxes accommodate 50 pairs, the aerial cables being either 25 or 50 pair capacity. Some loop poles, however, are much larger, having as high as 150 pairs, but these are exceptions. The highest point of efficiency would be attained by making each pair appear at every distributing pole, but in general practice a method called "over lap" is used. To better understand the system let us consider a specific case, illustrated in the diagram, Fig. 2. Here we have three distributing boxes, two of ten pair capacity and one of five. On the box to the left pairs 336 to 345 appear; at the next pairs 337 to 340 and 345 to 350 are available, and at the 5 pair box there is an indiscriminate number, 330, 387, 341, 348 and 300. Considering the ten pair boxes, it will be seen that pairs 337 to 340 and pair 345 overlap or appear at both boxes, thus it is apparent that a certain call number can be used for a subscriber whose service lines are connected to one of these boxes, and that if he moves to a district served by the other box he will still be able to retain it. In the case of the five pair box, pair 341 appears at the left hand ten pair box, and pair 348 at the centre box.

For ease in identification, the various loop routes of a system are designated by numbers, and the system itself, if having more than one exchange, is also subdivided. For instance, in a city there are three exchanges, Main, Gerard, State. All the loop poles associated with the Main exchange would be termed M loops, and would be numbered M1 M2 and so on. Now the distributing poles that are connected with a loop are also numbered, and besides have the loop initial and number prefixed to their own; that is, M6-23 would be distributing pole 23 on loop M6 line. In some cases all the poles are numbered on a loop line, the distributing pole number being also the pole number. As an example: on a loop line there may be 40 poles; of these, numbers 10, 20, 30 and 40 are distributing poles. There is an advantage in numbering all the poles, that it acts as a guide to location and also serves as a ready reference to locality and distance.

In Fig. 3 is illustrated a plan of distribution by means of a 200 pair underground cable and three loop lines. The underground is indicated by the dotted lines to distinguish it from the aerial cables. The exchange is shown at G, consequently the loop poles are prefixed with the same letter. It will be noticed that there are two sections to the underground, each of which consists of 100 pairs. The section including pairs 1-100 pass on to another locality and would be outlined on another map. At some future time it is probable that these two hundred pair sections will be drawn out and a two hundred pair cable used instead. The general scheme of overlapping will be seen from the diagram and requires no extra description.

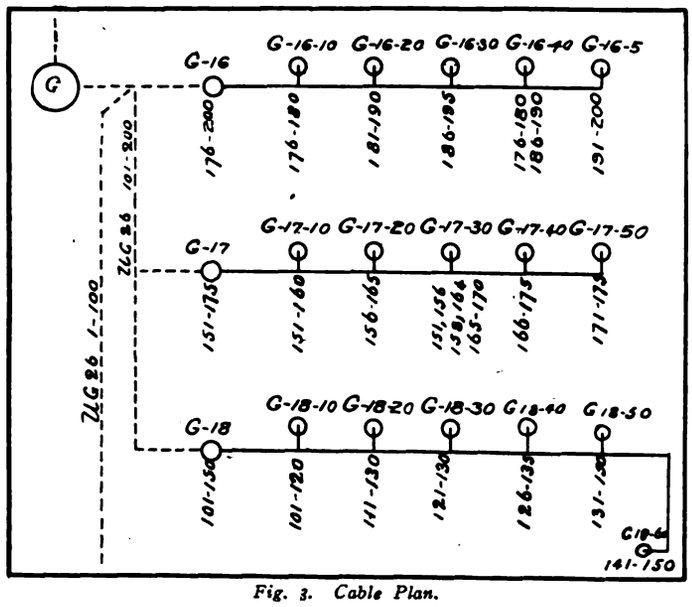

Fig. 3. Cable Plan.

Fig. 4 illustrates the method of distribution. Attention is called to the two cables. It often happens that a loop line is only completed for a short distance, in which case a 25 pair cable would be ample. But as the system grows the loop line is extended. To take care of the additional points of distribution a new cable is run from the loop box, which saves the expense of taking down the old cable and replacing it with a larger one to fit the new conditions over and above that which is necessary to run the additional cable.

In many instances the loop box is also used for distribution, as is the case in Fig. 1. There are some points of interest in line construction shown in this illustration which are worthy of passing notice. It will be seen that instead of twisted pairs that single lines are used for service distribution, although the jumper wire forming the connection between the terminals within the box and the line conductors is of the regular type. The reason for this is that in long swings the friction of one conductor upon the other, especially in windy weather, impaired the insulation to a great extent, and necessitated the renewing of the service lines more often than the income from the circuit would warrant.

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FROM THE ENGLISH STANDPOINT

"OH! wad some power the gift to gie us to see oursel's as ithers see us."

Our English cousins are beginning to discover that the rule of the Bell is not altogether desirable, and are commencing to consider the advisability of securing telephonic service in some other fashion. But instead of a commercial development which is Independent, English telephony has taken on a municipal form, a number of exchanges having been established in several of the prominent cities under municipal control. The operations of these English systems have been recently described in a paper by Mr. A. R. Bennett, a telephone engineer of even trans-atlantic notoriety, presented to the meeting of the Institute of Electrical Engineers at Glasgow.

In the beginning Mr. Bennett gives the history of the various exchanges. The first was that of Guernsey, established in 1898. This exchange has now 1,230 telephones, and as the population of the island is only 40,300, it appears there is nearly one telephone to every 33 inhabitants, a percentage which has rarely been exceeded. For the year ending December 31st last, this exchange shows a net profit of £201, after providing for interest, sinking fund, etc., and as orders continue to be received the telephone possibilities of Guernsey are by no means exhausted.

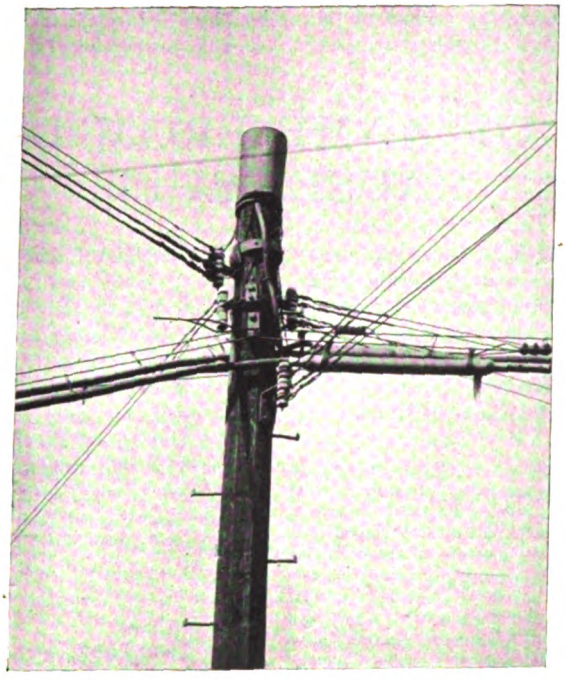

Fig. 4. Distributing Pole.
"Multiple Cable Distribution"—see preceding page.

The second exchange, and the one to a description of which the bulk of Mr. Bennett's paper is devoted, belongs to the Corporation of Glasgow, and commenced operation March, 1901. This system started with 3,000 subscribers and has now 11,200. The balance sheet for year ending May 31, 1904, shows a gross income of £50,968 and a net revenue of £20,519, leaving a surplus after providing for interest on capital invested, and sinking fund, of £3,650. The third of the so-called corporation exchanges is that of Tunbridge Wells, where originally provisions for only 300 lines was made, but in a few months subscribers had increased to over 900. Unfortunately, the Corporation of Tunbridge Wells was so weakly supported that subsequently it allowed its exchange to be purchased by the National Telephone Company, and it passed under Bell control. Nevertheless, as the Corporation secured a profit of £3,000 over and above installation and operating expenses, the enterprise certainly, from a commercial standpoint, has been a success. The fourth exchange is that of Portsmouth, opened March, 1903, now carrying over 1,700 telephones, showing for the first year a profit of £1,000. The fifth exchange is that of Swansea, opened in August, 1903, having now 800 telephones connected. As this plant is of recent origin, statistics for a full year's operation are unavailable. The last exchange is that of the Corporation of Brighton, opened in November, 1903, with 900 telephones, having now over 1,000 telephones in service.

The statistics presented by Mr. Bennett are extremely encouraging, and as the adviser of the largest of these corporations we must certainly congratulate him upon the excellent showing which this form of English telephony has made. Unfortunately, when the author comes to describe the technical side of the telephone systems, particularly that of Glasgow, which have been installed under his immediate supervision and in accordance with his recommendations, one stands aghast at the telephonic ignorance displayed, and we sincerely recommend Mr. Bennett to take a short educational vacation to be spent in the United States, where we can assure him of a hearty and open-armed welcome, and where it is certain that he can, if he so desires, acquire much information concerning modern practice of telephony.

It seems that in Glasgow there are nineteen switch rooms (English vernacular for branch office). In fourteen of these the so-called *"Bennett Ring Through System"* has been installed, while in the other five the old, antiquated and utterly obsolete call wire system is in vogue. American engineers will probably hardly understand what is meant by a ring through system, and for their benefit we hasten to explain that in a ring through system a subscriber calls the office and is put in communication with his desired correspondent by the operator. There the operator's work ceases and the subscriber is expected to continually grind the crank of a magneto until the wished-for correspondent appears at the telephone. In America the proposition to install a telephone exchange with anything but automatic signalling would be received with a smile of derision, while to make subscribers ring each other, for themselves, would create a guffaw that, we believe, would resound even across the Atlantic. But Mr. Bennett, in apparently all seriousness, points out that by this method the telephone company can unload on to the subscriber a portion of the legitimate work which belongs to the operator, and thereby save itself expense and trouble. This is not in accordance with the American Independent watchword, "Good Service," whatever our Scotch friends may believe. For the larger offices in Glasgow the old-fashioned call wire of the Law system is installed. The objections to this method are so numerous and so obvious that America entirely discarded the last exchange built upon this plan ten years ago, and no American telephone engineer would for a moment give the slightest consideration to an exchange involving this method of operation. To discuss all the experiences which led America to abandon the call wire would be to rehash history which is too trite for the columns of an up-to-date technical telephone journal. In a half-hearted way, Mr. Bennett endeavors to defend the use of the call wire and the ring through system by the extraordinary plea that the automatic signal common battery system is controlled by the Bell interests, while it has received a slight development in America among the Bell companies, is by no means sanctioned by good telephonic practice. If Mr. Bennett will accept our invitation to visit these shores we can easily show him that the bulk of the telephones in America, whether Bell or Independent, are operated by common battery systems, and that, in some respects, the Independent interests can show common battery circuits which in theory are better, and installations which are superior to those of the Bell companies. For example, the Independent exchanges in Philadelphia, Rochester, Buffalo, Cleveland, Los Angeles, and a host of other smaller places are entirely common battery. And when Mr. Bennett asserts that common battery transmission is not as good as that furnished by local battery, he assumes a position from which he could be statistically hurled without the slightest difficulty.

The cables used in Glasgow are said to be air space cables

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chiefly laid in underground conduits. The wire is No. 22 and No. 20 gauge, depending upon the length of the subscriber's lines. The largest cables are reported to contain 217 conductors in a space of 2.75 inches. And when subsequent to the discussion of the paper, it was pointed out that 400 or even 600 pair cables were now common practice, Mr. Bennett defends the adoption of the 200 pair cable upon the ground of the superior talking secured by a capacity of .07 m. f. per mile. How Mr. Bennett can perform the gastronomic feat of straining at so small a transmission gnat as one or two hundreds of an m. f. capacity per mile length of line and swallow the camel of the impoverished talk of the average local battery is difficult to see.

In the construction of the underground conduits a large proportion of three-inch cast iron pipe is laid, which is said to have a cost upwards of 6 pence per foot. To install the best possible plant for a telephone exchange is the height of wisdom, but Mr. Bennett displays remarkable powers of logic when he is able to convince his board of directors of the desirability of using cast iron pipe at six pence per foot when terra cotta pipe, which is more durable and equally efficicious, can be obtained for a penny.

That English telephone engineers, on the whole, did not entirely coincide with the views expressed by Mr. Bennett, was forcibly brought out in the discussion which followed the reading of this paper. In defence of the call wire and ring through systems the author alluded to the difficulties and troubles experienced with relays in the newer forms of switchboard. In this connection Mr. Gill, of the London system, showed that in the London board, using 6,700 cut-off relays, there were 178 cases of trouble in a year, equivalent to .026 faults per relay per year, or one fault for each relay in 37½ years. And if the line relays be included, with which there is less difficulty, there was but one fault per relay in 50 years. Contrasted with the amount of trouble with the series jacks of the Glasgow board, which Mr. Bennett admits, relay trouble seems to be too insignificant for even a passing thought.

Such are a few of the many interesting and extraordinary features in the Glasgow Corporation system to which Mr. Bennett calls attention, but the most valuable feature which this paper emphasizes is the appreciation which Scottish subscribers accord to the service afforded. If a telephone system so designed as to inflict five or six different methods of operation upon the subscribers within the limits of a single city; that requires its patrons to do their own ringing with the obsolete magneto, or makes them wait their turn upon a call wire; and installed with so lavish and extravagant a hand as to employ six penny iron pipes in its subway system in lieu of one penny clay ducts, can be shown to earn £20,000 on a subscription list of 12,000 subscribers, what would be the result if a uniform and modern automatic signal common battery installation was substituted?

OMISSION OF NAME FROM DIRECTORY CAUSES SUIT.

THE State of Indiana on behalf of Ashjian Bros., rug manufacturers of Indianapolis, has made a motion in the Superior Court in that city for a writ of mandate upon and $5,000 damages from the Indianapolis Telephone Company because of the latter's omission to put the name of the firm and its telephone number in the last issued Telephone Directory. The firm had a telephone put in their place of business in March, 1902. The complaint reads in part:

"The company installed in said place of business of relators one of the telephone instruments, assigned the number 6403, under which they might enjoy all the benefits and privileges of the telephone plant; and it thereupon became the duty of the company, as an inseparable part of said general telephone service, to supply to relators as one of its patrons, all the necessary and proper connections and facilities for the prompt, quick, successful, correct, economical and advantageous use of said telephone instrument, so that they, at their place of business, in calling and conversing with others and also by other patrons at their homes or place of business in locating, designating, calling and conversing with relators, all without any discrimination against relators, as one of such patrons of the company, and without the imposition of any condidtion or restrictions upon relators not imposed impartially upon all other patrons. That for the express purpose of making it possible for its patrons to comply with the rules and regulations of the company and to call and be called by number only, in compliance therewith, and for the further express purpose of informing all the patrons, including relators, of the correct and true number and numbers by which and through which any and all of said patrons could call and be called, through said exchange, said company issued a book called a "Telephone Directory—New Telephone Company, Indianapolis, Indiana," and delivered a copy thereof to each of its patrons, which book undertook to contain and set forth the true and correct name of each and every one of the several patrons of said company at the date of the issue thereof, the kind and character of the place where each and every one of said patrons were located, and the street and number thereon where each and every one of said patrons were located, in alphabetical order, from A to Z (inclusive), together with the number by which patrons might call and be called, set opposite, in bold type, each and every one of said names of said patrons; and also undertook to contain a true and correct business classification of the names of all its said patrons from "Abattoir" to "Y. W. C. A." inclusive, in which said alphabetical list of patrons the true name, number, business, street and number of patrons were correctly set forth, as "6403—Ashjian Bros.—Rug Factory—460 West Seventeenth" and in the classified list, as "Rugs"—"6403———— Ashjian Bros." That said telephone directory was the sole and only guide and the sole and only source of information of and to said relators of and concerning all other patrons of and concerning relators as patrons of the company and was a necessary, inseparable, and indispensable adjunct and facility of and to the telephone service which it was undertaking to furnish to the general public, including relators, for the prompt, quick, successful, correct, economical, advantageous and valuable use of said telephone service and without which said service would be practically valueless to each and all the patrons."

The complaint further alleges that the directory is of "great and incalculable benefit and advantage" to the relators in furnishing them with the only proper and obtainable means of communication with all other patrons of the telephone company; that by omitting their name from the directory the company reclaimed and took out of the hands of its patrons and thereby withdrew from them the only source of information the patrons could obtain concerning the relators and held out and represented to its patrons that relators were not patrons of the company and could not be communicated with over its telephone lines. It is set out that the relator's place of business is far distant from the business district of the city and remote from street car transportation, on account of which they rely upon the general telephone service of the company in a large measure for the transaction of their business.

By the omission of their names from the directory it is claimed they have suffered damages in the sum of five thousand dollars. The relators have paid their telephone rent to July 1. They ask the court to compel the company to insert in every copy of the directory in the hands of its patrons the name, telephone number, etc., of the relators. The telephone company has not yet filed its answer but it is understood that it will hold that the directory is not a part of the telephone service and is not essential in order to enable its patrons to get telephone service. The new directory was issued only three months ago. The name of the complainants was accidentally omitted. One or two other omissions were caught before the book was bound and were made to appear on inserted slips between the proper pages.

As the complainants paid $10 for the three months' service and claim a $5,000 loss because, as alleged, the service is not complete, it is apparent from their complaint that an investment of a few dollars for an Independent telephone in Indianapolis brings mighty good returns.

COMPOSITE SYSTEM FOR UNION PACIFIC.

THE Union Pacific Railway has been experimenting the last four months with a telephone system of its own in its shops and offices at Laramie and Cheyenne, Wyoming. A station was also put in at Buford, where the gravel pits are in operation. The telephones were connected directly with the telegraph lines and the same current used for both telegraphic and telephonic purposes.

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THE INDEPENDENT OPPORTUNITIES IN VIRGINIA.

OPPORTUNITIES for the construction of Independent telephone systems are to be found throughout the States, but in no section of the country are there to be found so many and varied propositions of interest in the Independent telephone field as in the South. Starting with Richmond, Virginia, which is now Bell, a good Independent service at reasonable rates could in all probability secure from 6,000 to 8,000 telephones. Petersburg, Virginia, 22 miles south, also supplied by the Bell system, could support from 1,000 to 2,000 Independent telephones. Newport News, Virginia, is another town where an Independent company should be able to achieve first-class results. Besides these there are the towns of Danville, Reedsville, Greensboro, Winston-Salem and Salisbury, which have no Independent service. Adjacent to the towns mentioned there is good farming country with

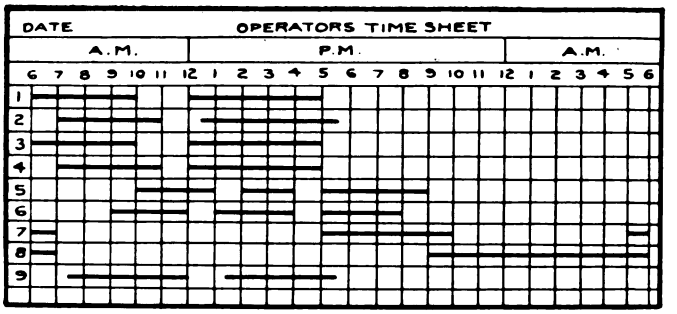

Fig. 1.

country villages and stores, making the situation a very desirable one in which to develop Independent systems. The cost of building is very much cheaper than it is in the North or West, consequently from a financial standpoint the outlook is very encouraging.

In the matter of construction, in very few places would it be necessary to blast holes for pole lines, and on account of the temperate weather, construction work could be carried on at practically all times. As a suggestion, some of the country lines might be built by the farmers and connected with the switchboards of the town systems. Farmers would in all probability buy their own telephones and could be expected to pay at least 50 cents per month for connections given them. Each town is a center for the farming communities. In this way toll connections could be secured through the various exchanges which would add a good deal to the revenue of a system. It would be necessary for each exchange to join with the others in the construction of a general toll system, the territory between each being proportionately divided.

Aside from the cities mentioned, the following towns have Independent systems in operation: Suffolk, which is 67 miles from Richmond, has an Independent system with good country connections. The Independent exchange at Norfolk connects with the Suffolk system. Blackstone, which is 37 miles from Petersburg, is also Independent, as is Crewe, which is 11 miles away. Lynchburg is another Independent town, as are also the towns of High Point, Thomasville, Lexington and Concord.

The people are generally dissatisfied with the Bell methods of business and will readily take up Independent propositions which are sincere. The trouble has been heretofore that in some cases the Bell monopoly has scared Independent companies into some traffic arrangement with them, which, when the deal had been completed, the Independents found themselves at the mercy of the Bell interests. A general uniformity of action between Independent companies of the South would surely bring forth as good results as has been the case of the Independents in Ohio, Indiana and Iowa. Southern people are not hard to please and yet they are not less human than their northern brothers. If the opportunity were offered them to secure the same telephonic advantages as have the inhabitants of the Northern States mentioned, there is not a question of a doubt but that the Independent movement not only in the State of Vinginia, but throughout the whole South, would be as successful as any others throughout the whole length and breadth of the land, which have taken up the cause of decent service and reasonable rates.

The miserable methods of the Bell systems have caused the subscribers to pay more for their service for one year than does the average Independent company charge for two. This difference of rates is used by the Bell company in other sections of the country to enable it to throttle competition by means of rate wars. The claim of the Bell companies of the South has been that the Independents have no long distance connections. It is thoroughly certain that not 15 per cent. of the people in Virginia use long distance lines, so that this croak of the monopoly which has been used to prevent Independent telephony is but another instance of a pernicious method employed to scare away investment in Independent telephony.

KEEPING OPERATORS' TIME.

By C. O. Nicholas.

ONE of the most important duties of a chief operator is the time keeping of the operators in her charge. The writer suggests the following method, which is simple and which has the added advantage of giving a ready reference as to the exact time which an operator spends at the switchboard during the various hours of the day, and also allows the best distribution of operators.

Fig. 1 is the form to be used for the Daily Time Sheet, and should be ruled as indicated. Each of the operators should be given a number by which they should be known. These numbers are placed in the left-hand column. Now the heavy dark lines indicate the hour that each operator is on duty. For instance: Operator No. 1 is on duty from 6 A. M. to 10 A. M., from 12 M. to 5 P. M. Operator No. 5 is on duty from 10 A. M. to 1 P. M.,

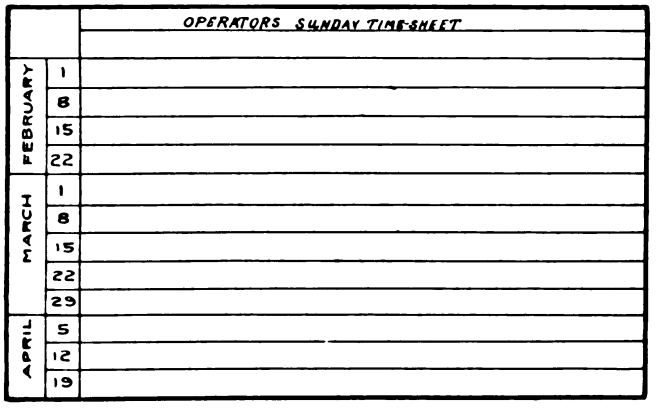

Fig. 2.

and from 2 P. M. to 4 P. M., and from 5 P. M. to 9 P. M. Operator No. 8 is on duty from 9 P. M. to 7 A. M.; that is, her time commences on the date of the time sheet and continues until 7 A. M. of the next day, but should be included in the previous day's time record.

Fig. 2 is a form for operator's Sunday time. For instance: Opposite the first Sunday in February should be placed the operators to work that day, say 1 and 2, then on the 8th operators 3 and 4 should be assigned, and so on for the 15th and 22d, if possible, so that if there are enough operators none of them have to work more than once a month on Sundays. To prevent having all old operators on at one time and new operators the next, it is a good idea to give the oldest operators odd numbers and the new operators even ones, so that when an operator drops out the place can be filled by the next higher, if it is an odd number, or by the lower number should the missing operator's number be even.

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AN OPINION ON EXCHANGE ARRANGEMENT

EDITOR'S NOTE.—We insert the accompanying letter from a valued correspondent because we believe the topic to be one of general interest, and views from all standpoints are of value to our readers. There is, however, no such thing as a uniform standard in telephone office arrangement. In some places a single office is best adapted; in others, branch offices and trunking facilities must be provided; here a large and rapidly expanding toll business must be cared for; there, little such traffic is to be expected. Mr. Clausen's suggested arrangement is appropriate and sufficient to one set of conditions, Mr. Wilhelm's to another; both are good, for, like the Druid's Shield, the problem presents different aspects from different viewpoints, and no one standpoint can possibly include all.

RESPECTING an article which appeared in the AMERICAN TELEPHONE JOURNAL entitled "Model Exchange Arrangement," I would like to make a few remarks:

The floor plan of operating room, as shown in the cut, Fig. 1, is not in accordance with the most advanced practice. One of the most potent factors in determining the nature of the floor plan is the probable growth. Now with the toll boards lined at right angles to the main switchboard, as shown, the direction of their growth is necessarily at right angles to that of the main board. Any increase in the dimensions of the building to accommodate the one would be useless in accommodating the other. The ideal arrangement would be to line up the toll boards in the position now occupied by the last two sections, shown in dotted line, then the direction of their growth would be towards the rear of the room. If the main board increases to a point where it meets the toll board a new toll board must be lined up on another floor, and when it is completed the present toll board can be turned into main switchboard. However, by removing the partition around the present toll room, the length of the main operating room can be increased, so that the first section of main switchboard can be placed at the point now occupied by the first section of toll board. This arrangement would allow of a greater number of sections being accommodated on that side of the operating room, and consequently, allow of a greater growth before the line of toll boards was reached.

In the floor plan of the operating room there are no incoming trunk sections shown. I assume, however, that they are present. The growth of the subscriber boards and toll boards being independent, the present practice is to line the two up separately, bridging the subscriber and ring down trunk multiple at the intermediate frame, as shown at Fig. 2, where an elevation of the building is with the subscriber boards on the floor above that carrying the trunk boards. The cables are shown bridged at the intermediate frame. It is not absolutely necessary to resort to this device, however, except in the case of large offices where the growth is rapid. For an office of the size shown the best plan would be to locate the trunk positions at the first sections of switchboard, leaving two or three blank positions for growth. The positions marked "toll," I presume, are the incoming trunks from toll board. In view of the fact that there are only two toll sections, and therefore about 16 or 20 toll lines, I cannot conceive the necessity for so many of this type of trunk.

B. C. WILHELM.

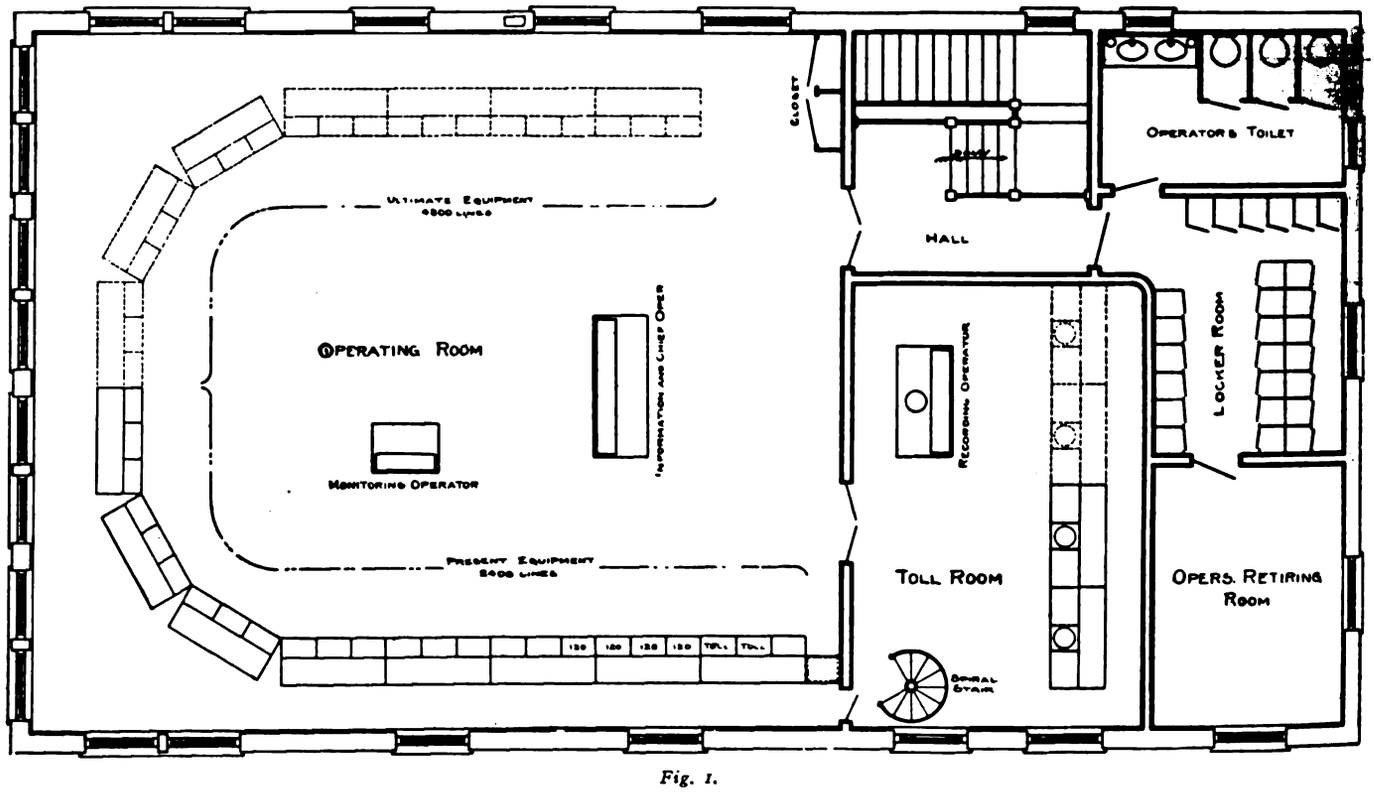

Fig. 1.

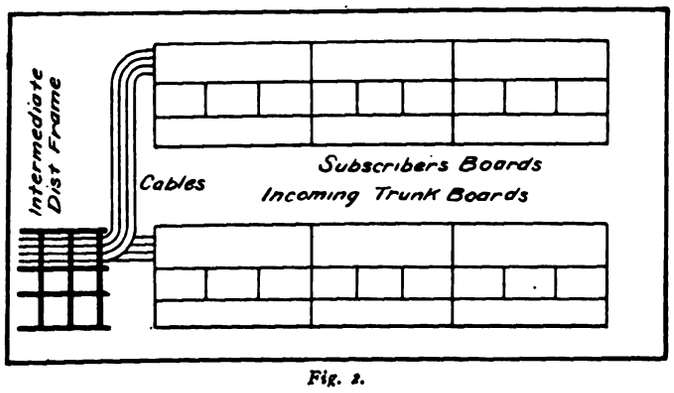

Fig. 2.

TELEPHONE NEWS FROM PANAMA.

JAMES E. BRAILEY has returned from the Isthmus of Panama, where he went in the interest of the Brailey & Barber Telephone Construction Company. Mr. Brailey says that Central and South America has improved rapidly in the past few years and that such modern inventions as the telephone and telegraph have been introduced throughout the whole territory. He thinks there is a great field in the tropics for the investment of surplus American capital.

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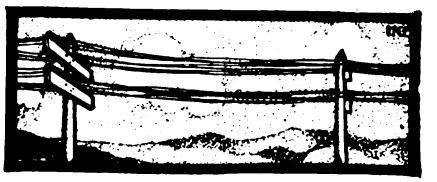
QUERIES

Questions on any subject relating to telephony will be answered on this page.



CABLE TESTING—(390).

What do you think about a direct-reading ohmmeter for locating trouble in a cable? Can it be done to advantage? If not, do you know of any other instrument that would answer the purpose and easy to operate and understand? G. W.

A direct-reading ohmmeter is an excellent instrument for all kinds of testing which may be required by a telephone exchange. A Wheatstone bridge is another instrument that can be used for the purpose. This is somewhat more accurate, but requires some skill in operating and consumes more time in making tests.

TOLL METER—(391).

Will you please illustrate the connection of the toll meter as used by the Bell Companies? J. C. W.

In Fig. 391 is illustrated the general connections employed. The meter *a* associated with the line, is tapped on to the third or sleeve connection, and is called the line meter. The meter *b* is common to all the cords of a position, and is termed the position meter. When a call is to be registered the button shown in the drawing is pressed. This places the position meter in series with an 8-volt battery in addition to the regular 24-volt battery, and also forms a shunt path around the supervisory lamp and associated resistances. The circuit is completed through the

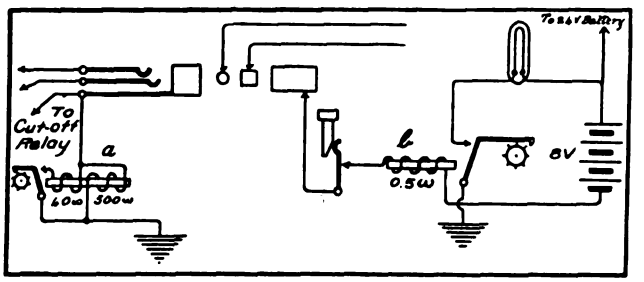


Fig. 391.

sleeve of the jack and through the 500-ohm winding of the meter relay. The relay armature is thus drawn up, and when it closes the circuit through the 40-ohm winding the relay *b* of the position meter is operated, closing the meter pilot lamp circuit and showing the operator that both meters have registered.

The reason that two windings are used on the line meter is that if for any reason there is a high resistance in the circuit it will not allow enough current to flow through to operate the relay by means of the 500-ohm winding, whereas if there was only one winding of a lower resistance enough current might flow to operate the line relay but not enough to operate the position meter.

PHANTOM—(392).

I have noticed that the word "phantom" is used in conjunction with two trunk circuits which are so connected as to give a third. I do not quite see the relation between the word and the use. P. G.

The word "phantom" means an illusion and is applied to telephone circuits where a new one is created by means of two others without in any way interfering with them. The term "phantom" is also applied to composite telephone and telegraph circuits because the operation of the telegraph circuit is not evidenced in the working of the telephone circuit.

MEASURING RESISTANCE WITH VOLTMETER—(393).

I have a voltmeter measuring 15 volts in half volts (coil measures 66 ohms), how can I determine the resistance of a line by the deflections? R. G.

To measure a resistance with a voltmeter it is necessary to know the resistance of the voltmeter. Let this resistance be called *r* and the resistance to be measured *R*. Place the voltmeter and a battery in series and note the deflection, which may be termed *D;* then place the battery, the voltmeter and the resistance to be measured in series, and note the deflection, which may be termed *d*. Then the following equation is true $R = \frac{r\,(D - d)}{d}$. Solving this equation will give the value of *R*. This method of testing is dealt with very fully under the heading of electrical measurements in the issue of March 7, 1903.

RELAY CIRCUIT—(394).

Is a relay in series or shunted on a telegraph circuit? K. S.

Usually the relay is in series on a telegraph circuit, though in some cases it may be put in shunt.

POLARITY OF INDUCED CURRENT—(395).

Does the induced pulsating current in a telephone coil go below the zero line as an alternating current does? K. S.

In the secondary or induced circuit of an induction coil the current is alternating and varies from both positive to negative values.

MAKING TRANSPOSITIONS—(396).

Will you describe the best method to be employed in making line transpositions? G. L. T.

The method generally used at present is shown in Fig. 396. To make this transposition cut the wires *A C* of such length as to enable them to be dead ended on their insulators, slip over each wire a McIntire sleeve and run it back about two feet, carry each wire to its insulator and dead end it with a half sleeve. Cut the

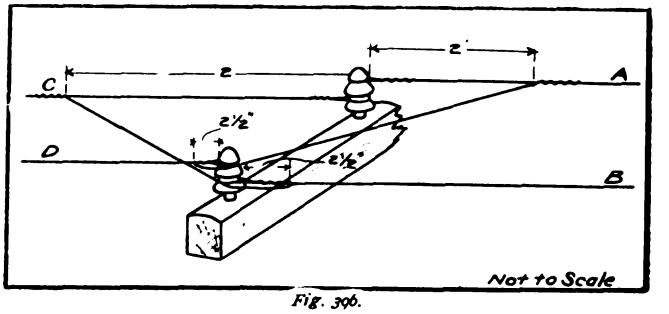


Fig. 396.

wires *B D* about 5 feet longer than is necessary to reach their insulators, carry each to its insulator, turn it around the insulator and dead end it with a half McIntire sleeve, then carry the slack over the wires *A* or *C*, introduce it in the McIntire joints previously specified and twist the same into a joint. By following these directions you should have no difficulty in cutting in the transposition correctly.

GROUNDED LINES IN A CABLE.—(397.)

We have been installing a telephone system and have been told by an agent not to put a few metallic circuit lines into a cable that has grounded circuits. What harm will it do? W. R.

The era of grounded lines is rapidly disappearing, and consequently a company which installs this form of plant is hardly living up to the Independent motto, "Good Service." Aside from this it is inadvisable to put grounded lines in a cable that is used for metallic circuits, since if each side of a pair were used for a separate grounded circuit, cross talk would be inevitable between the two lines and also to a greater or less extent between all the other pairs of the cable. It is best, as far as possible, to keep the grounded and metallic circuits entirely separate. If grounded wires are caused through the cable both wires of a pair should be used for a line.

CONDENSERS—(398).

Would condensers help the ringing on a grounded party line or hurt the talking and would all the instruments have to have them or would one work on a certain instrument and not affect the others? J. L.

The use of condensers in a telephone circuit is confined almost entirely to common battery operation or to some special form of selective signaling in conjunction with other apparatus. The object of the condenser when used in the bell circuit of a common battery instrument is to prevent the current flowing through the ringer coils and thus operating the signal. In magneto work there is no need for its use, since the only battery there is, is in the local circuit controlled by the hook switch. If you would let us have a better idea of what you have in mind we will be pleased to answer at greater length.

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AN INSPIRED NEWSPAPER REPORT.

THE following account of a "telephone war" to be waged against all Independent companies by the American Bell Telephone Company is taken from a newspaper exchange: "The trust, known as the Bell Telephone Company, has inaugurated one of the greatest financial conflicts in the world. It is determined to rule or ruin every Independent line that is trying to exist in opposition to it. The Independents themselves, growing bolder because of their success against the trust, caused the attack. They began organizing to resist any attempt of the Bell company to crush them, and the Bell people determined to strike the blow before the organization of the Independent companies in Indiana, Illinois, Michigan and Ohio could be completed. The recent removal of the Chicago offices of the Bell company to Indianapolis was regarded with suspicion by the Independents. Recent reports lead them now to believe that the Bell company wished to have its headquarters nearer the scene of its conflict with the Indiana Independent telephone companies."

This somewhat remarkable announcement, which doubtless in its original form came from some inspired source, has appeared in one shape or another in various parts of the country in accord with the well-known Bell methods of influencing public opinion through the newspapers. It is difficult to understand just what ideas the newspaper fraternity have regarding the telephone situation in the United States. The average editor unless his investigations have brought him in direct contact with the Independent telephone movement is a little hazy in his views regarding Independent telephony.

He is familiar with the Bell company in all its ramifications, for the Bell interests have been wise in their appreciation of the power of printer's ink; but often he displays very little knowledge of that great wave of revolt against Bell monopoly, which, starting in the Middle West ten years ago, has been sweeping steadily and irresistibly across the country in every direction. One would think from reading news and comments of the character quoted, circulated originally in order to affect Independent securities and discourage Independent competition, that all the Bell "octopus" has to do is to reach forth its giant tentacles and lay hold of the territory coveted.

The newspapers referred to do not seem to realize that the tentacles have in a measure lost their grip; that, while the American Bell Telephone Company is still a powerful corporation and has some strength left in the West, this strength is largely in its long-distance service. Strip the Bell of its long-distance possibilities, or, what amounts to the same thing, give the Independents equal long-distance facilities, and the old monopoly could not begin to hold its own. This latter is what is being done. The time is now not far distant when the Independents will be able to offer the public long-distance connections on an equal footing in this respect also.

It would be well for the Independents to learn something from their friends the enemy, and pay more attention to the publicity end of the business. That the public should always maintain the correct attitude toward Independent telephony is important. The public at large has only one means of getting information on such matters. The newspaper press is the go-between. All doors swing open to the newspaper, and homes which zealously exclude all evil companions welcome the daily sheet, though burdened with evil communications. The readers of a periodical like the AMERICAN TELEPHONE JOURNAL are necessarily limited to those who are in some way interested in the telephone business. This journal can reach the great reading public only indirectly. The Bell people have figured on this in planning their newspaper campaigns in the past, and it is reasonable to suppose that similar methods will obtain in the future.

AN OBJECT LESSON IN PUBLICITY.

It would, no doubt, be a surprise to many usually well-informed newspapers to know that in this rich territory of the Central West, where beats the great heart of the nation, the number of Independent telephones in service far exceeds that of the Bell, and that they greatly surpass the Bell in service.

Probably the Bell company has some defined line of attack in view which gave rise to the newspaper squib referred to. Its recent success in borrowing twenty million dollars, on top of other indebtedness, although indicating an unfortunate financial condition, shows that the trust has not lost all of its teeth, and that there is "something doing." Stated with a proper regard for truth, the plan is probably like this: "We must make a great struggle in this Western territory, not so much to get back what we have lost as to keep ourselves from being driven from the field entirely by these unspeakable Independents." In other words, the horse has been stolen; the barn will now be locked so that the carriage may not be taken also.

There was a time when the field could have been closed against Independent competition, and there was a way in which Independents could have been shut out. The trouble is that the necessity was not apparent until it was too late. That way will not always prevent a healthful competition; but in the case of the telephone monopoly it would have been very effective. The plan referred to is very simple, merely to make competition unnecessary. If the Bell people had studied how to give the best service for the least money, instead of how to give the least service for the most money, they would not now be borrowing millions in order to put their exchanges on a competitive basis and save the remainder of their business from a vigorous and growing rival.

There was a time when all this could have been done; but it is now everlastingly too late. The Bell company is still a power. With its great financial resources and its centralized authority it can accomplish much if it really has awakened to the needs of the situation. But it can no more stay the progress of Independent telephony than the sea can be swept back with a broom.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

COMPELLING GRANT OF FRANCHISE.

I have known of some cases where the councils would not grant the permit of franchise to local companies and they have taken the matter to the courts and there received same or the courts have ordered the council to grant same. My attorney wants to know if any of these cases or decisions have been from the United States Courts, or just from the State courts. We may be up against the same thing in this section, and if so desire to know where to look for the authority for such law, as he says the law in this State gives the whole power to the Selectmen. Can you give me any light on the subject and tell my attorney where to look for the law. H. C. H.

THE following are cases of the kind you ask about: Norwalk & South Norwalk Electric Light Co. v. Common Council (Conn.), 42 A. 82; State ex rel. Bell Telephone Co. v. Flad, 23 Mo. App. 185, 2 Am. Elec. Cas. 128. I know of no United States cases. Your attorney is undoubtedly right in his opinion. It is only where the duty of granting a franchise or license is imposed on the council and no discretion given the aldermen or selectmen that they can be compelled by the courts to act. State ex rel. Home Telephone Co. v. Common Council (N. J.), 40 A. 628.

HOW CAREFUL MUST COMPANY BE?

SOME employees of the Cumberland Telephone & Telegraph Company were stretching wires along a turnpike road in Kentucky and at the same time a man was driving a two-horse wagon along the same pike. One of the poles of the company broke about seven or eight feet from the ground, under the tension of the wires, and was thrown into the highway, striking the man who was driving upon the head and knocking him off the seat of his wagon and into the highway. For the injury thus received the man sued the company. On the trial the circuit judge instructed the jury that the care required of the company was ordinary care, which he defined as "that degree of care usually exercised by ordinarily prudent and skilful men." The company alleged as error the use of the word 'skilful' and appealed to the Supreme Court. The court held the use of the word not to be erroneous, saying: "The business of operating a franchise along a highway by means of agencies which may endanger the lives or limbs of the traveling public necessarily requires a certain amount of skill, as well as prudence, in carrying forward the business in hand. One may be prudent without being skilful, or skilful without being prudent. It would appear that the operation of a franchise, such as the one under consideration, with due regard to the safety of the public, requires at least an ordinary amount of prudence and skill; and, while the addition of the word "skilful" may be unusual, we are inclined to believe that it is technically correct." Cumberland Telephone & Telegraph Co. v. Warner (Ky.), 79 N. W., 199.

TELEPHONE CONVERSATIONS AS EVIDENCE.

IN a suit to recover a balance alleged to be due to the plaintiff from the defendant for services rendered in securing a customer for an express business in Salem, the Supreme Court of Massachusetts declared what the rule should be as to receiving telephone conversation in evidence. The only question in the case was whether a witness was properly allowed to testify to what he heard the plaintiff say as part of an alleged conversation with the defendant over the telephone, the plaintiff being in Boston and the defendant in Chelsea, and the witness being in the presence and hearing of the plaintiff. The witness had not personal knowledge with whom the plaintiff was talking, did not hear anything that was alleged to have been said by the defendant, and did not know that the defendant heard anything that the plaintiff said; the plaintiff testified that the conversation was with the defendant.

The court held that the evidence was rightly admitted. Said the court, "the evidence that was admitted cannot be regarded as hearsay evidence or declarations made by the plaintiff in his own interest, simply because the witness did not know, of his own knowledge, that the other party of the conversation, was the defendant, or that there was any other party, or that the defendant heard what was purported to be said to him. If the alleged conversation took place as the plaintiff testified that it did, then what the plaintiff said was admissible as a part of it. Whether it did take place as alleged, or was fictitious, was a question of fact for the jury. It could not be ruled, as matter of law, that there was no evidence of a conversation between the plaintiff and defendant of which what was testified to by the witness constituted a part. McCarthy vs. Peach (Mass.), 70 N. E. 1029.

WIRES FALLING IN STREET.

IT is the duty of a telephone company to use ordinary care to keep its poles and wires in repair, and, if they fall to the street, to prevent them from remaining therein to the interruption of traffic. Tennie Pharis recovered judgment against the West Kentucky Telephone Company and the city of Mayfield for $250 each as damages for injuries received from tripping over one of the telephone company's wires in the street. The wire was attached to two poles of the company that fell during a heavy and destructive storm of sleet in 1902. The principal defense was that plaintiff admitted in her testimony that she had previously seen the fallen wire and should therefore be presumed to have known of its presence at the time of the accident and the necessity of avoiding contact with it. She testified, however, that she had forgotten about it and had her mind intent on the sickness of a sister she had just come from attending. The court held that, having forgotten the defect, plaintiff was not guilty of contributory negligence. West Ky. Telephone Co. v. Pharis (Ky.), 78 S. W., 917.

DAMAGES FOR TRESPASS.

E. T. WHITEMAN, of Dallas County, Texas, sued the Southwestern Telegraph and Telephone Company to recover damages for trespassing upon his premises. He alleged that the company, by its employees, entered his private yard, erected a telephone pole and strung wires thereon, which were dangerous to the life, limb, and security of the occupants of his house by reason of their close proximity thereto; that his premises would be subject to constant invasions for the purpose of mending and repairing the wires; and that the placing and wiring of the pole materially decreased the value of his property. He asked $600 actual and $400 exemplary damages. Before the trial he amended his declaration, alleging that the pole had been removed from his premises by the company and a large hole left where the former pole stood; that he had employed lawyers to institute suit, and that he had lost time which he placed at $5.20 per day in trying to get the company to remove the pole. He was given judgment for $135.

On trial he was permitted to answer the question, "what would have been the depreciation in value of the land if the pole was now there?" and answered, "all the way from $300 to $700." This testimony the court of civil appeals of Texas held inadmissible because the pole had been removed at the time of the trial. It further held that the plaintiff could not recover for his lost time in trying to get the company to remove the pole, because it was not the natural and probable result of the trespass. The plaintiff was not entitled to recover on the allegation that the pole was placed dangerously near the house because it had been removed without damage. The court also decided that no exemplary damages should be allowed. Judgment was reversed. Southwestern Teleg. & Tel. Co., vs. Whiteman, (Tex.), 81 S. W. 76.

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IN THE OPERATING FIELD.

IMPORTANT OHIO PRECEDENT ESTABLISHED.

THE city solicitor of Cleveland has made use of the decision of the State Supreme Court in the Toledo telephone case to settle a dispute of long standing between the City of Cleveland and the Cuyahoga Telephone Company. In brief the Supreme Court's decision in the Toledo case was that the municipality has no right to regulate telephone rates.

Some six months ago the Cuyahoga Telephone Company readjusted its schedule of rates, making some of them slightly higher than they had been before. The city coucil of Cleveland took the matter up, claiming that under the terms of its franchise the company had no right to make such a readjustment. The dispute between the council and the company became somewhat heated, and the council proposed to cut the company off from the privilege of erecting poles or laying cables in the streets.

Now, under the Toledo decision, the city solicitor holds that the council has nothing to say regarding the readjustment of rates and that, moreover, it is powerless to prevent the erection of poles or such other improvements as the company may desire to make, as long as it keeps within the ordinances of general application.

IMPROVEMENTS OF UNITED STATES COMPANY.

JUST as soon as arrangements can be made for starting the work, the United States Telephone Company will begin the expenditure of $450,000 to better its service throughout Ohio and adjoining States. The recent announcement of a loan for the amount named above has attracted much attention among telephone people and it is predicted that its effect on the United States Company's system will be even more far reaching than had been thought.

The plans call for the running of a large number of new lines on the poles already placed. As comparatively few poles will be set, the larger part of the amount secured for the improvement of the system will go to increase the available wire mileage. It is estimated that almost 9,000 miles of lines will be strung by the time the plans are carried out. It is calculated that this will increase the earning power of the company by one-half. Together with the announcement of the securing of the large sum for long-distance improvements came that of the reduction of the debt of the Federal Telephone Company by $600,000. These two moves are considered by telephone men to have been the most significant in Ohio Independent fields for many years.

THE WESTON EMPLOYEES' CLUB.

AN experiment in social economics which has attracted the attention of the Bureau of Statistics in New Jersey is that of the Weston Electrical Instrument Company, at Newark, in that State. In this period of generally strained relations between capital and labor, it is pleasant and unusual to find a plant whose owners are carefully endeavoring to draw together, rather than sunder, the relations between themselves and their employees. The "Weston Employees' Club," which is now about a year old, is the outcome of an idea often revolved by the president of the concern, Professor Edward Weston. Briefly, Mr. Weston's plan has been to give his employees a live interest in their business by showing that, on its part, the company for which they work had a live interest in them. A club-house, being a part of the operating plant, was made over to the employees; the latter then organized the association referred to. The club is now entirely free from company paternalism.

Recreation rooms, library, kitchen, dining room, gymnasium, swimming pool, bicycle racks and hospital have been established in the association's commodious quarters. The sanitary and other appliances are of the highest type, such as are to be found in the buildings of first-class clubs and hotels in large cities. The result of this experiment has been that the attachment of the employees to the Weston Company is very highly developed. Each man expects his connection with the corporation to be for life and looks upon his future progress as bound up with that of the company, of which he is a part. A little pamphlet recently prepared for the Louisiana Purchase Exposition gives a full account of this unique experiment and to it we would refer our readers for fuller information.

THE BELL OUTGENERALED.

THE appointment of receivers by Judge Audenried, of Philadelphia, for the Standard Telephone and Telegraph Company, of Pennsylvania, marks the defeat of the Bell corporation in its endeavors to get control of the concern. The appointment of Mr. I. D. Ginhart, auditor of the Keystone Telephone Company, as one of the receivers is a distinct victory for the Philadelphia Independents and presages the passing of control to the Keystone people. There is only one other receiver—T. O. Atkinson, treasurer of the Bucks County Trust Company.

The Standard Company has a capitalization of $100,000, and is the possessor of valuable franchises in Bucks County, Pa., and in New Jersey.

The application for receivers was made by John A. Roebling's Sons Company, wire manufacturers, Trenton, N. J. Other claims amounted to $18,000. The value of the system is estimated at $150,000. Judge Audenried required the receivers to enter security for $50,000, and empowered them to continue the business.

LONG DISTANCE CONNECTIONS FOR HOME COMPANY, OF LOUISVILLE.

WITHIN a week the Home Company, of Louisville, Ky., will have a line in to Kansas City, and this will be followed by immediate connections between Louisville and Topeka, Kan. A line is also in process of construction between Richmond, Ind., and Dayton, Ohio, which will give the Home telephone a line into Pittsburg. With the completion of this forty miles of telephone line, which will be ready for service in about thirty days, the Home company expects to be able to secure a little later a line into Philadelphia and Baltimore. This will be accomplished by an amalgamation of interests with the United Telephone and Telegraph Company of New York State and Pennsylvania, whose lines radiate from Harrisburg, Pa.

NEW SYSTEM FOR HOPKINSVILLE, KY.

THE Ideal Construction Company, of Lima, Ohio, has added another successful plant to the rapidly growing number which it has been called upon to install. This latest addition is the system of the Hopkinsville Home Telephone Company, of Hopkinsville, Ky. Hopkinsville has had a telephone service (?) supplied by the Cumberland Company for a number of years, but the people had realized for a long while that if there was to be any relief from the excessive charges and the poor service given that they would have to secure a system of their own. So after serious consideration the contract was let to the Ideal Company. Under the able direction of Arthur W. Hoge, president and treasurer, and Gustav Hirsch, vice-president and general manager of the Ideal Construction Company, rapid strides were made in the installation of the system towards its completion which took place recently. The officers of the Home Company are R. E. Cooper, president; G. H. Metheaney, vice-president; J. F. Garnett, treas-

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urer; F. G. Hoge, secretary, and J. T. Edmunds, general counsel, together with the directors: E. M. Flack, Hon. W. T. Fowler and J. Russell.

The Home Company is to be congratulated upon the method in which the project was carried through and also for the assistance given by the Ideal Construction Company, which is recognized as being one of the best organized and best equipped construction companies in the United States.

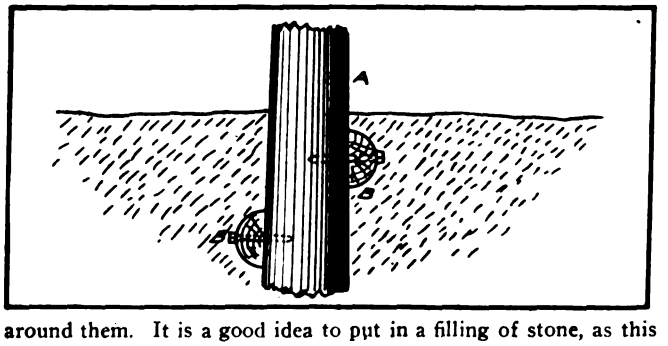
INDEPENDENT SYSTEM FOR EAST DUBUQUE.

THE Tri-State Telephone Company is perfecting plans for the construction of a sub-marine cable for the extension of the line to East Dubuque. The work of building the cable has already been commenced at a Chicago factory and it will be completed next week. It will require 2,375 feet of sub-marine cable to span the river, besides 3,600 fett of aerial cable, which will be run from the river's banks to where the wires spread out in Dubuque and East Dubuque.

AN UNDERGROUND POLE BRACE.

IN localities where it is not possible to place a guy wire for a pole support, the method illustrated in the accompanying figure is generally employed.

Two logs, *B B*, about five feet long, are shaped as illustrated and then bolted to the pole; the earth is then thoroughly tamped



around them. It is a good idea to put in a filling of stone, as this will enable the logs to be more firmly secured. In marshy ground this method of construction could be employed with a large measure of success.

When the logs are used in place of guy wires they should be placed as nearly at right angles to the direction of strain as possible, to secure the best results.

ANOTHER CASE OF BELL METHODS.

MAXTON, N. C., is having the usual trouble with the Bell Company. It appears that until about three years ago the telephone service was furnished by a local company, organized in 1898. The concern gave general satisfaction and netted handsome dividends for its owners. It was then bought out by the Carolina Telephone and Telegraph Company, which showed the usual signs of being conducted in the Bell interests. The new owners allowed the service to go down hill steadily, made no repairs on the line and neglected the maintenance department. Of late months, the service had become so poor that a continual string of protests had been registered at the office. The Carolina Company now informs its unfortunate subscribers that the corporation is preparing to improve the service by entering into relations with the Bell system and by doubling its rates. An indignation meeting was held a few days ago and there is great interest in Maxton and its vicinity as to what the result will be.

A PROSPEROUS PENNSYLVANIA COMPANY.

THE first annual meeting of the Union Telephone Company, which operates in the town of California, in Washington County, Pennsylvania, was held recently. The report of the directors for the year showed that the operating accounts after paying two dividends amounted to $563.75, a balance of $230. Besides the balance in cash there is about $1,000 worth of material and construction tools on hand, showing that the construction work has been very carefully and economically carried out. The matter of another increase in the capital stock was discussed and the advantages of still further extending the company's business was recognized. Additional lines will be built to accommodate the increasing demand for service and toll line connections will be established to Pittsburg and other points in Pennsylvania, and also with Ohio and West Virginia.

The Union Telephone Company has achieved exceptionally good results for the short time it has been in business and it is evident that the people in the vicinity appreciate the value of an Independent system. It now has 225 subscribers and the construction force is kept busy adding new lines to accommodate the large number of parties on the waiting list. The company is capitalized for $15,000, of which $12,590 has been subscribed for.

INDEPENDENT MEETING AT COLUMBUS.

THE executive committee of the Ohio Association of Independent Telephone Companies has divided the State into nine districts for organization and mutual working conditions. There will be a meeting of the vice-presidents of the association at Columbus, Ohio, on August 8. Plans will then be laid for a thorough organization of the Independent telephone companies of the State.

SECOND DISTRIBUTION OF PROFITS TO CUYAHOGA EMPLOYEES.

DURING the last week the employees of the Cuyahoga Telephone Company at Cleveland received their portion from the profit sharing plan which the company voluntarily established about a year ago. This distribution was for the first half of the present year and amounted to 6 per cent. of the total salary received by each employee for that period. There had been much computation among the employees as to what their shares would amount to and much satisfaction was expressed as they were more than had been anticipated. The distribution covered all classes of employees and meant the turning over by the company of several thousands of dollars. Probably the operators fared the best of any class, as within the past six months they received an advance of 25 per cent. in their salaries, and this addition was figured in with their totals.

This is the second distribution under the profit sharing plan, which was established a year ago by President Dickson and given a six months' trial by way of experiment. It proved to be so satisfactory to all concerned that in his annual report to the directors and stockholders, President Dickson recommended that it be continued. On his recommendation it was decided to make it a permanent business feature of the company.

AN INDEPENDENT L. D. DIRECTORY.

THE National Telephone Company, of Wheeling, W. Va., is at present distributing its first long distance telephone book to subscribers and it contains all the features that have so far characterized its directory of subscribers, principal among which are the classified lists in the back. The book is much greater in size than its previous issues and shows a substantial increase in business, while a feature that is announced throughout it is that every telephone is privileged to long distance service. It has almost complete service to the towns of West Virginia, Eastern Ohio, and Western Pennsylvania, while it announces that in a short time its service will be extended to a far greater radius, ultimately covering practically all of Ohio, Pennsylvania and West Virginia within the next thirty days.

FEDERAL COMPANY'S FINANCES.

THE Federal Telephone Company has taken up Reserve Construction Company notes amounting to about $630,000, with United States Telephone Company bonds. This reduces the outstanding obligation of the Federal Telephone Company to $900,000. Two years ago this was $4,000,000. The report caused a strengthening of the stock on the Cleveland Stock Exchange.

The statements of the company's earnings for June show a small deficit in one of its subsidiary companies and a good surplus in the remainder.

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TELEPHONE PATENTS

INDUCTANCE COILS FOR LOADED LINES.

M. I. Pupin, of New York, patents (No. 761,995) and assigns to the American Bell Telephone Company, of Boston, Mass, the method of making induction coils for loaded lines. In this patent Dr. Pupin describes the method for manufacturing inductance coils to be used in series with telephone lines for the purpose of reducing the attenuation which is so destructive to successful long-distance telephony. The method of winding and connecting the coils, which Dr. Pupin describes, is shown in the accompanying illustrations in Figs. 1 to 5, inclusive. In the course of the patent Dr. Pupin specifies three conditions. The first condition is that the coil should be as small as possible, which he recommends to be accomplished by distributing the windings of the coil over the core and by arranging the coils in such a manner that the same core contains the windings for both the outgoing and incoming conductors. The second condition requires that the insertion of inductance coils should not disturb the electrical distribution of the current wave. This is to be accomplished by making both windings of the same inductance and same resistance and winding them symmetrically in respect to the core. The third condition requires that there should be no mutual inductance between neighboring coils belonging to different circuits. The illustrations in Figs. 1, 2 and 3 are sufficiently self-evident of the method adopted by Dr. Pupin to require no further explanation. The first two claims in the patents are as follows:

Fig. 1.

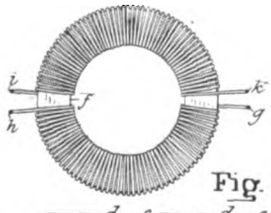


Fig. 2.

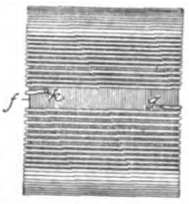


Fig. 3.

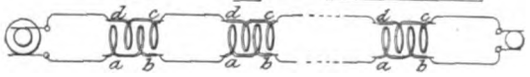


Fig. 4

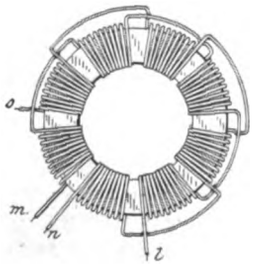
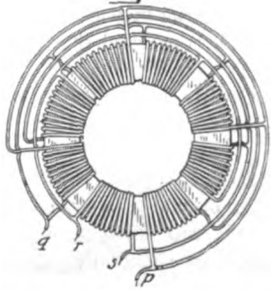


Fig. 5.



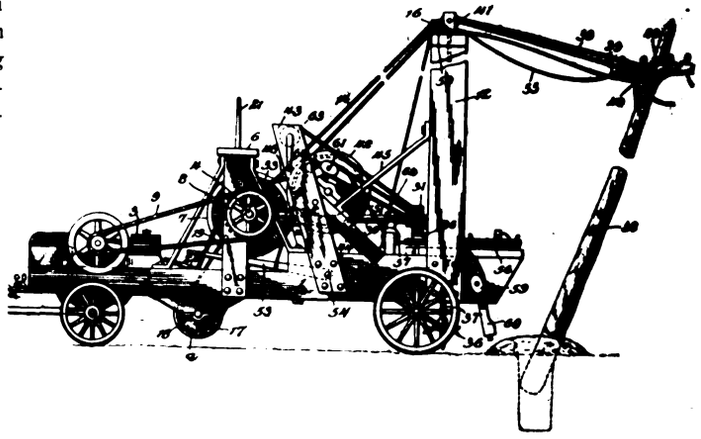
1. An inductance coil having an iron core, forming a closed magnetic circuit, in which the resistance due to hysteresis is smaller than the resistance due to Foucault currents for current strengths and for the highest important frequencies (about 1,500 p. p. s.) in telegraphy or telephony, substantially as described.

2. An inductance coil having an iron core, forming a closed magnetic circuit, in which the resistance due to iron core losses of energy is smaller than five times the true ohmic resistance of the winding of the coil for all telephonic frequencies up to 1,500 p. p. s., and for current strengths of importance in telegraphy or telephony, substantially as described.

A slight consideration of these claims indicates that Dr. Pupin has taken out a patent for a condition, and not for the means of securing that condition. In other words, this patent closely resembles the famous Bell patent of 1876, which was construed by the courts to cover the *undulatory transmission of speech*, and if the present patent should be treated with the same liberality, it could be held to cover all forms of inductance coils which produce a certain result, irrespective of the method employed in their manufacture. It is to be hoped that when the inevitable contest arrives the courts will exercise the same good sense and discrimination that has recently appeared, and will not hold that this patent is one of those much-to-be-deplored grants which places inordinate power in the hands of a single inventor, or the corporation to whom he assigns his patent.

APPARATUS FOR ERECTING TELEPHONE POLES.

William Parker, of Tecumseh, Neb., patents (No. 762,490) an improved apparatus for erection of telephone line poles. The invention is shown in the side elevation in the accompanying illustration, which has for its object the provision of an apparatus



whereby a motor can be mounted upon a proper car and said motor can be employed to drill a hole in the ground, into which the pole may be planted and also to arrange a derrick whereby the pole may be easily handled and planted. The general features of the invention are sufficiently indicated by the drawing to warrant a further description unnecessary.

AUTOMATIC LIGHT SWITCH FOR TELEPHONE BOOTHS.

J. L. Bolan, of South Connellsville, Pa., patents (No. 764,792). The object of this invention is to provide an electric switch for illuminating a telephone booth. The inventor accomplishes this by supplying the armature of the ringer with a kind of a trigger, so that when the telephone in the booth is called the ringer magnet is actuated, the trigger set free, closing a switch to turn on the electric light.

MESSAGE COUNTER.

E. H. Smythe, of Freeport, Ill., patents (No. 764,690), and F. R. McBerty, of Evanston, Ill., patents (No. 764,752) and assign to the Western Electric Company, of Chicago, Ill. The object of these patents is to provide a switchboard circuit to be used in conjunction with a message counter located at the subscriber's substation so arranged that the chief operator or supervisor shall be notified in case the operator does not properly record the message. As both these patents are essentially the same they will be construed in one description. The subscriber's substation is shown provided with a counting device, which consists of a slot to receive the coin-containing contacts so that the definition of the coin shall complete the circuit and enable the subscriber to signal the exchange. There is a polarized magnet, c', that actuates a lever, c^4. If the operator sends positive current, for example, over the line, the lever c^4 will cause the coin to be deposited

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in the cash box, c^2, while, if the operator sends negative current, the coin will be delivered to a chute and returned to the subscriber. Referring to Fig. 1, which is the drawing accompanying patent No. 764,752, it will be seen that the operator's cord circuit is equipped with the double key *k k'*. The office of this key is to

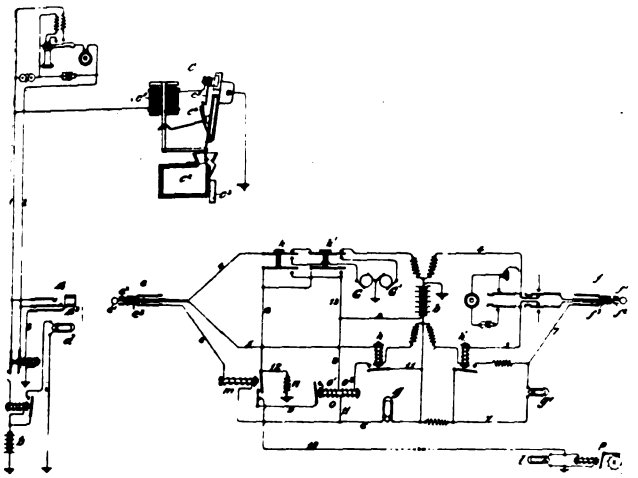


Fig. 1. Patent No. 764,752.

enable the operator to send the proper polarity of current to the subscriber's station to actuate the coin-controlling device. The operation of this system is as follows:

When the answering plug *e* is inserted in the spring-jack *a* the local circuit *6 3* is completed, and the telephone at the substation being off the hook the circuit of the battery *b* through the link conductors *4 5* and over the telephone line will also be completed, so that the supervisory relay *h* will be excited to close the shunt *11*, which contains the winding o^2 of magnet *o*. Relay *m* should operate a moment before relay *o*, and the spring jack

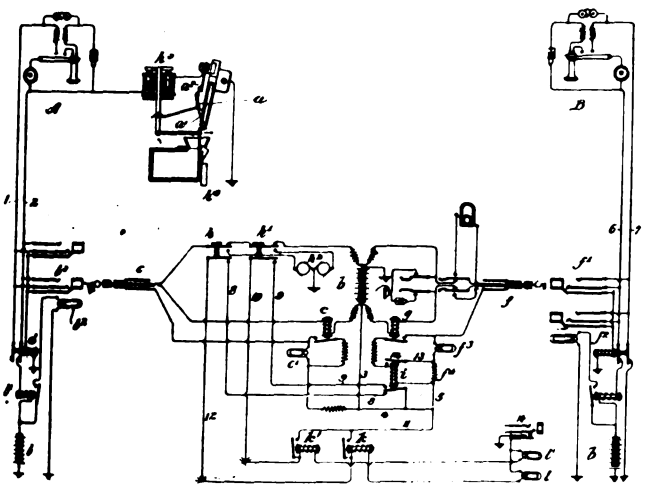


Fig. 2. Patent No. 764,690.

and plug are so constructed that the contacts e^3 a^3 will come together to close the circuit *6 3* before the ring contact e^2 of the plug strikes the longer spring of the jack to complete the circuit of conductor *5*. Relay *o* being excited will close its contact and establish the local circuit *8, 9, 12*, so that said relay will remain excited independently of current in the shunt *11*. If now the operator should withdraw the plug *e* from the spring jack without having actuated one of the keys *k k'*, the relay *m* on being de-energized would complete the connection between the conductors *9, 10* before breaking the connection of the ground conductor *12*. The signal lamp *l* and counting device *p* would thus be actuated and the chief operator informed that the connecting operator had failed to actuate her toll keys. The counting device and signal may be made common to all the plug circuits of one operator, so that a record of her omissions may be kept. After the subscriber has hung up his telephone the operator, before withdrawing the plug, must depress one or the other of the keys *k k'* to actuate the toll device, and in so doing the short circuit *13* around the winding *o'* will be completed, so that the relay *o* will be deprived of current and its armature will fall back, breaking the connection between conductors *8* and *9* and preventing the operation of the signal and counter.

SELECTIVE SIGNALLING SYSTEM.

T. C. Drake, of Malta, Ohio, patents (No. 763,970) a selective signalling system. This is an improvement in the ordinary four party line pulsating selective signalling system, and is illustrated in the accompanying drawing, from which it will be seen that the lead from the generator runs to the center of the battery *y*. This battery is so arranged as to be positive on one side of the line and negative on the other. Therefore, if the positive side of the generator is applied to the same side of the line as the negative battery the battery will reinforce the positive and weaken the negative waves

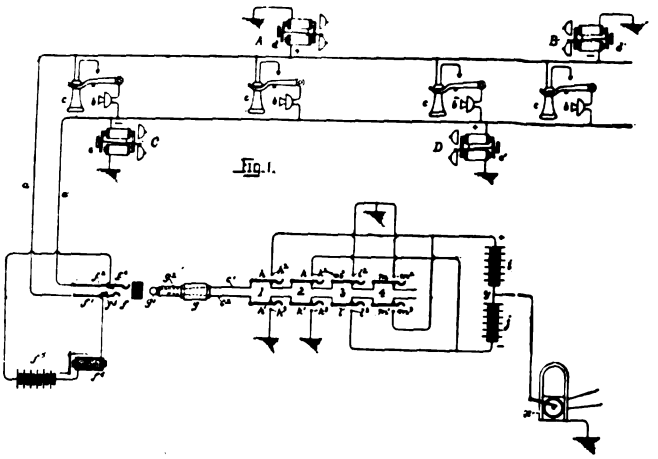
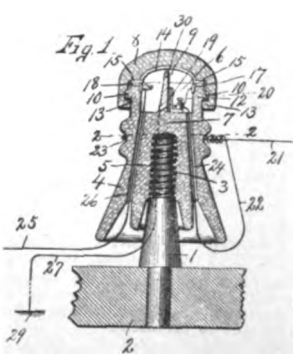


Fig. 1.

and conversely if applied to the other side of the line in the ordinary pulsating party line with biased bells, the bells are made selective by the operation of the spring which causes the bell to be non-responsive to currents in one direction. Now, it is evident that the combination of battery and generator thus shown, accomplishes about the same results by intensifying one side of the generator waves and weakening the other. Thus it is possible to do away with the biased spring and secure the same results simply by the weight of the clapper and armature, which is sufficient if the bells are placed horizontally as indicated, and the bell is much more sensitive and not likely to get out of adjustment.

COMBINED INSULATOR AND FUSE BOX.

A. Bearse, of Syracuse, N. Y., patents (No. 761,814) a combined insulator and fuse box. This invention is shown in the accompanying illustration, from which it appears that *1* is a pin which supports an insulating cap *7*. It is cone-shaped, and upon it the insulator proper *4* is placed. The top of the core *7* is arranged



to carry a heat coil and fuse, ground connection being obtained by means of the wire *27*, as is shown, while connection to the line wire is obtained by the wire *22*. Over the top of the shell *4* an insulating cap *8* is arranged to be secured either by a bayonet joint or a screw. The operation of this device is sufficiently shown by the illustration.

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THE WEEK'S MESSAGES

FINANCIAL.

SAN FRANCISCO, CAL.—The Automatic Direct Line Telephone Company, of San Francisco, of which some prominent business men of this city are stockholders, has reorganized under the name of the Direct Line Telephone Company and has raised the capital stock from its former figures of $250,000 to $1,000,000.

DENISON, IOWA.—The Stockholders of the Crawford County Telephone Company have declared a dividend of ten per cent per annum. After the meeting was over $10,000 worth of additional stock was sold. The principal stockholders are citizens of Denison and Charter Oak and farmers of Crawford County.

MITCHELLVILLE, IOWA.—The Mitchellville Telephone Company has increased its capital stock from $10,000 to $25,000.

ALBANY, N. Y.—The Suffolk County Telephone Company has certified to the Secretary of State that its capitalization has been increased from $3,500 to $13,500. The certificate is signed by Walter H. Joycox, R. C. Greene, J. T. Lovee, Daniel Chichester and M. F. Tiger.

CANANDAIGUA, N. Y.—The Seneca-Gorham Telephone Company has increased its capital stock from $10,000 to $30,000. The lines are to be extended to Bellona.

CANASTOTA, N. Y.—The Farmers' Telephone Company will increase its capital stock from $1,000 to at least $10,000.

FRANKFORT, KY.—The Oldham Telephone Company has increased its capital stock from $10,000 to $20,000.

OSWEGO, N. Y.—At the semi-annual meeting of the directors of the Ontario Telephone Company the regular three per cent. annual dividend was declared.

SOUTHAMPTON, N. Y.—The Suffolk County Telephone Company has increased its capital stock from $3,500 to $13,500.

MOUNT PLEASANT, OHIO.—The Mount Pleasant Telephone Company has increased its capital stock from $5,000 to $10,000. Michael Gallagher is the president of the company.

YOUNGSTOWN, OHIO.—The Youngstown Telephone Company has increased its capital stock from $200,000 to $400,000.

PHILADELPHIA, PA.—It is reported that the Maryland Telegraph and Telephone Company will issue $6,000,000 bonds, of which $2,000,000 will be used to build an electric light and power house, and the balance to retire the first mortgage bond and exchange for the general mortgage bonds.

FRANCHISES.

GREENVILLE, ALA.—A franchise has been granted to J. C. Watson, of Georgiana, who will install a local telephone system.

SAN BERNARDINO, CAL.—F. B. Daley, representing the Arizona, Nevada & Southern Telephone Company, of Needles and Kingman, has applied to the county supervisor for a franchise to construct a line from Needles to San Bernardino. It is the intention of the company to build to every mining camp of consequence and extend into Nevada and Arizona.

ALTON, ILL.—The Fosterburg-Upper Alton & Main Line Telephone and Telegraph Company was granted a franchise to build a telephone line into the village.

CENTRALIA, ILL.—An ordinance has been passed granting a twenty-year franchise to C. D. Morey, G. E. Eis, Robt. Rohl, Hugo Prill and A. Harding to operate a telephone system.

DUBUQUE, IOWA.—The Interstate Telephone Company, of this place, has presented a petition to the city council of Omaha asking that it be granted a franchise to operate a telephone system in that city.

GALENA, KAN.—The Galena Home Telephone Company has secured a franchise in this city and will begin construction at once. The capital stock of the company is $10,000.

BELLAIRE, OHIO.—The Ohio Valley Telephone Company, which recently purchased the local telephone system, has applied to the city council, through Attorney J. C. Heinmein, of Bridgeport, for a new franchise. He stated that if the franchise was granted that a new exchange building would be erected, new lines built, and from $65,000 to $75,000 expended on improvements.

READING, PA.—The Consolidated Telephone Company, of Reading, has been granted a franchise to construct a system at Mauch Chunk.

ELECTIONS.

SAVANNAH, GA.—At the annual meeting of the stockholders of the Georgia Telephone and Telegraph Company the following officers were elected: W. A. Bisbee, president and general manager; J. H. Estill, vice-president; C. S. Kenyon, treasurer, and W. V. Davis, secretary.

CONCORDIA, KAN.—The Northern Kansas Telephone Association held its annual meeting and elected the following officers: J. M. Doyle, Belleville, president; C. W. Baldwin, Osborne, vice-president; G. G. Hill, Concordia, treasurer, and D. C. Tyler, Clifton, secretary.

BALTIMORE, MD.—At a meeting of the directors of the Maryland Telephone and Telegraph Company the following officers were elected: David E. Evans, president; H. W. Webb, vice-president and general manager; Stanley Baker, assistant to president.

MUSKEGON, MICH.—At the recent annual meeting of the Muskegon Citizens' Telephone Company the following officers were elected: President, Thomas Hume; vice-president, B. D. King; treasurer, L. B. Smith; secretary, W. H. Mann; manager, William Robinson. The board of directors consists of Thomas Hume, Thomas Monroe, Dr. D. B. King, J. G. Emery, Jr., C. H. Hills, L. B. Smith and E. B. Fisher. A semi-annual dividend of four per cent., payable July 20, was declared.

PATERSON, N. J.—At the annual meeting of the Paterson, Passaic & Suburban Telephone Company the following officers were elected: Charles W. Kline, president; George A. Post, vice-president; James W. Lindsay, secretary, and Barker Gummere, Jr., treasurer. Many improvements are being contemplated.

COLUMBIA, PA.—The Columbia Telephone Company has elected the following officers: H. C. Young, Dr. S. S. Mann, Charles E. Taylor, H. M. Hall, C. E. Lenig, S. W. Hinkle and C. S. Oberlin.

URBAN, PA.—At a meeting of the stockholders of the Citizens' Telephone and Telegraph Company E. R. Reitz was chosen president. The capital stock of the company will probably be fixed at $15,000 or $20,000.

COMBINATIONS.

BEDFORD, IND.—The Bedford Home Telephone Company has purchased the Bryantsville line and is now ready to give patrons service from the home exchange.

BATAVIA, N. Y.—All the telephone companies operating in the ten villages of Ontario County are taking steps toward a consolidation of interests. Collectively they have over 1,300 subscribers.

NEW CASTLE, PA.—The Citizens' Telephone Company, operating in New Castle and Lawrence County, has been sold to a Philadelphia syndicate and sweeping improvements are scheduled for the local system. Every assurance has been given that the company will continue Independent.

SAVANNAH, TENN.—Arrangements have been perfected for the consolidation of the Savannah Telephone Company, the Tennessee River Telephone Company, the Clifton Telephone Company and the W. N. Sloan Telephone Company. Several extensions and improvements are contemplated.

LA CROSSE, WIS.—The La Crosse Interurban Telephone Company has purchased the Barre Mills Telephone Company. The officers of the new company are . G. Schweiser, president; C. H. Schweiser, secretary and treasurer, and W. D. Burford, superintendent.

NEW COMPANY NOTES.

TUCSON, ARIZ.—The Consolidated Telephone, Telegraph and Electric Comhpany has been organized to acquire and build a complete system of telephone lines throughout Arizona, New Mexico, Mexico and Western Texas.

RIVERSIDE, CAL.—A petition has been filed with the board of supervisors of San Bernardino County for a telephone franchise for a system extending from the west end of the Santa Fe bridge across the Colorado, southeast of Needles to Goffs, Daggett, Barstow and other desert towns, following the Santa Fe right of way into San Bernardino. The intention of the company is to commence work on the system within six months, and complete it within six months. It is backed by a rich Arizona syndicate, which has already control of paying lines in Arizona, Nevada and at Needles.

SAN FRANCISCO, CAL.—The Direct Telephone Company has been incorporated with a paid-up capital stock of $118,800, with headquarters at Bush and Kearney streets. The incorporators are Joseph A. Stulz, C. F. Runyon, Julius Fay, Robert Capelle, George W. Emmens, A. K. Andriano and C. K. Andriano. It is the intention to install a local system and also long distance lines connecting with other Independent companies.

WASHINGTON, D. C.—The Urie & Markham Telephone Tablet and Attachment Company has been organized with a capital stock of $30,000 by George Urie, Andrew A. Markham, L. A. McLaughlin, George M. Schafer and others.

CEDARVILLE, ILL.—The Cedarville (Stephenson County) Telephone Company has been incorporated with a capital stock of $7,000, by S. N. Roberts, S. F. Newhall and H. M. Fisk.

TROY, ILL.—The Troy Telephone Company has been incorporated with a capital stock of $10,000, by J. H. Steinhaus, J. W. Gornet and Christ Busse, Jr.

FRANKTON, IND.—The Farmers & Citizens' Telephone Company has been incorporated with a capital stock of $10,000. Incorporators: Thomas Bromley, Jr., E. H. Phillips and George A. Quick.

IDAVILLE, IND.—The Idaville Co-operative Telephone Company has been incorporated with a capital stock of $9,000, by T. B. Grim, J. F. Royer and T. J. Melom.

MAJENICA, IND.—The Majenica Telephone Company has been incorporated with a capital stock of $2,000 by George W. Gill, C. W. Myer and others.

ELSMORE, KAN.—The Katy Telephone Company has been incorporated with a capital stock of $6,000.

OLDHAM, KY.—The Oldham Telephone Company has filed an amendment to its charter, increasing its capital from $10,000 to $20,000.

WHITESVILLE, KY.—The Home Telephone Company will install a telephone system here.

GALENA, MO.—The Galena Home Telephone Company has been incorporated with a capital stock of $10,000.

ST. JOSEPH, MO.—The Fulton Long-Distance Telephone Company has been incorporated with a capital stock of $15,000, to operate a telephone line between this city and Fulton, Mo.

TROY, MO.—The Troy Telephone Company has filed articles of incorporation with a capital stock of $10,000. The incorporators are: J. H. Steinhaus, J. W. Gornet and Chris. Busse, Jr.

ELGIN, NEB.—The Antelope County Mutual Telephone Company, of Elgin, has been incorporated with a capital stock of $60,000.

STROMSBURG, NEB.—The new Polk County Telephone Company, of Stromsburg, has been incorporated with a capital stock of $100,000.

HALE EDDY, N. Y.—The Sherman & Hale Eddy Telephone Company has been incorporated with a capital stock of $7,000 by the following directors: John Thomas, N. N. Gordiner and Fred Kingsbury.

HIMROD, N. Y.—The Himrod Telephone Company has filed articles of incorporation with a capital stock of $2,000. The directors are: C. M. Van Dyke, E. P. Porter, H. S. Voorhes, W. A. McFarlin, Hiram T. Henderson and others.

MONTGOMERY, N. Y.—A meeting has been held at this place to take steps toward organizing an Independent telephone company. It is proposed

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to make connections with the Orange County Telephone Company, of Middletown; the Colonial Telephone Company, of Newburgh, and the Highland Telephone Company, of Highland Mills.

SHENANGO, N. Y.—The Castle Creek & West Shenango Telephone Company, of Shenango, has been incorporated with a capital stock of $500. J. N. Brooks, of Castle Creek; Benjamin B. Worden, of West Shenango, and W. L. Treadwell, of Glen Castle.

CHERRY VALLEY, OHIO.—The Cherry Valley Telephone Company has been organized with a capital stock of $3,000 by W. A. Webber, W. E. Miller and others.

GIRARD, OHIO.—The Girard Telephone Company has been incorporated with a capital stock of $35,000, by W. Sotze, J. C. Koehle, E. L. Huser, S. C. Hazen, J. C. Jones, W. J. Wallis and R. T. Izant.

ARIEL, PA.—The Wayne & Lackawanna Telephone Company, of Ariel, has been incorporated with a capital stock of $8,000.

UNDERGROUND.

PINE BLUFF, ARK.—The Southwestern Telephone & Telegraph Company is arranging to put its wires in this town underground.

PERSONAL.

R. S. CHAMBERLAIN, general superintendent, and A. J. Mason, division superintendent, Pennsylvania Telephone Company, accompanied by Manager Moore, of the Pottsville Exchange, have recently inspected the lines from Pottsville to Reading.

O. W. F. CROSSLEY, manager of the Youngstown Telephone Company, has resigned to become State superintendent of the Colorado Telephone Company, with headquarters in Denver.

F. R. HILLHOUSE, brother of A. S. Hillhouse, manager of the Stark County Telephone Company, formerly in the employ of the Central Union Telephone Company, has accepted a position in the traffic department of the U. S. Telephone Company.

CHARLES KENYON, chief inspector of the Providence Telephone Company, with headquarters in Providence, has been appointed to the position of manager of the Pawtucket branch.

C. P. MEBANE, of Cleveland, has assumed charge of the Massillon Telephone Company. Mr. Mebane has had an extended experience.

JOSEPH A. MURRAY, of Wilkesbarre, Pa., has been appointed general manager of the Fort Worth, Tex., Telephone Company.

BEN. S. READ, manager of the Chattanooga exchange, of the East Tennessee Telephone Company, has been promoted to the management of its Louisville plant.

L. K. WEBB has been made manager of the local exchange of the East Tennessee Telephone Company, at Chattanooga.

L. WHITCHER has been appointed manager of the Portland office of the New England Telephone Company.

MISCELLANEOUS.

RIVERSIDE, CAL.—The Home Telephone and Telegraph Company has placed the contract for the installation of its new system in the hands of the Empire Construction Company, of Toledo, Ohio. This contract calls for the delivery on the first of January, 1905, to the new company of 750 telephones, subscribed for, installed and in working order.

HAZLEHURST, GA.—The Hazlehurst Telephone Company has nearly completed its system in this vicinity.

VAN BUREN, IND.—The exchange of the Independent Telephone Company, including switchboard, office fixtures, etc., were destroyed by fire.

DES MOINES, IOWA.—The Iowa Telephone Company is throwing open its plant for public inspection on stated days in the week.

SANBORN, IOWA.—The local telephone exchange had a very narrow escape from destruction by fire. Considerable damage was done, but the flames were kept out of the central office.

NEW IBERIA, LA.—The People's Independent Telephone Company is steadily increasing its number of subscribers. A new line is being built to Pahoutville, about ten miles distant. The line to St. Martinsville has been overhauled and is in first-class condition.

HOMER, MICH.—The Woodbury Telephone Company has instituted free service with the town of Clarendon and Butler. There are over 200 subscribers to the system, and over thirty orders for service to be filled.

KANSAS CITY, MO.—The Home Company now has upwards of 9,000 telephones in service, and has completed its long distance lines to St. Louis and all intermediate points. A complete list of toll stations in Kansas and Missouri will appear in the new directory, which will be distributed the first of the week.

PENDER, NEB.—Mr. Harrison, of Wakefield, the new manager of the Independent Telephone Company, expects to have 15 telephones in and around Pender at an early date.

CANANDAIGUA, N. Y.—The Canandaigua is to have Independent telephonic communication with farms and villages as soon as the Interlake Telephone Company is in operation.

CLEVELAND, OHIO.—The Cuyahoga Telephone Company has begun a very active campaign to secure new business now that the new switchboard is in order.

NEWARK, OHIO.—Manager C. E. Hollander, of the Newark Independent Company announces that the Gratiot & Browsville Telephone Company has signed a contract for interchange of toll business. It is proposed to connect Linnville, Brownsville, Gratiot, Mt. Sterling, White Cottage and other places.

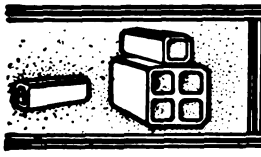
HARRISBURG, PA.—New telephones are being installed in all the offices of the Pennsylvania Railroad in the local shops. The new instruments are not much larger than an ordinary cigar-box, and when the receiver is taken off the hook the exchange is notified without the ringing of a bell as heretofore. There are seventy-five telephones to be installed, and they will be connected up as soon as possible.

PHILADELPHIA, PA.—The Keystone Telephone now has 14,205 instruments installed.

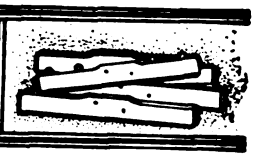
SPARTA, TENN.—The exchange of the Gainesboro Telephone Company was recently destroyed by fire.

QUITMAN, TEX.—The Quitman Telephone Company is negotiating a sale of the plant in this city.

SEATTLE, WASH.—The switchboard of the Independent Telephone Company was completely destroyed by fire recenty.



New Construction in the Field



KENDRICK, IDAHO.—The Inland Telephone Company is building a toll line to this town.

GLENARM, ILL.—A telephone line is being constructed between Glenarm and Chatham, which will shortly be completed.

HOPEDALE, ILL.—The Mutual Telephone Company is overhauling its system and putting in new cable.

WARREN, ILL.—The Jo Daviess County Telephone Company has installed its new switchboard in the Warren exchange and is now better equipped than ever before to handle the rapidly increasing business.

JONESBORO, IND.—Manager F. H. Neal, of the Home Telephone Company, states that he is putting forth every precaution to insure the best of service. He has a force of linemen at work on the lines, and some new equipments will be added so the system will be in the best condition by winter.

GRAETTINGER, IA.—The Graettinger Telephone Company has just completed its telephone system. It is thought they will purchase the Anderson system at Ruthven and consolidate the two systems.

SIOUX CITY, IA.—The Sioux City Telephone Company is receiving bids for the construction of its new exchange building to be erected on Jones street. The contract will be let August 3.

PELICAN RAPIDS, MINN.—The Pelican Telephone Company will extend its lines in every direction.

GLOUCESTER, N. J.—It is expected that the People's Rural Telephone Company, connecting farm houses in this county, will be in operation inside of a month. The main office will be at Wenonah.

HASTINGS, NEB.—The Farmers' Telephone Company has been connected with Trumbull. The entire system will be in working order shortly.

FULTON, N. Y.—The Fulton Telephone Company has nearly finished its new line between here and Rochester. The line will connect all the larger towns between these two cities, among which are Hannibal, Fair Haven and Sodus.

HAWLEYTON, N. Y.—The telephone company is stringing its wires and will soon be ready for service.

ROME, N. Y.—The Rome Independent Telephone Company is figuring on a number of improvements to take care of its increasing business. The switchboard will be added to, two new sections being built, and 20,000 feet of additional cable will be strung. The company has in the neighborhood of 1,100 subscribers, and is adding constantly to its business.

SALEM, ORE.—The trustees of the Rural Telephone Company, of Rosedale, No. 1, have filed an application in the county court for right-of-way for the construction of telephone lines in the Rosedale and Sunnyside districts, south of this city.

OKLAHOMA CITY, OKLA.—A telephone line has been completed from Oklahoma City to Davis, I. T.

FINLEY, N. D.—The Union Telephone Company has a force of men at work rebuilding its line from Blabon to Finley. A rural line running east and north will also be constructed.

CECIL, PA.—The Cecil Farmers' Telephone Company will begin the erection of its line in a few weeks.

NORTH EAST, PA.—The Mutual Telephone Company is extending its line to Ashton.

SHARON, PA.—The Union Telephone & Telegraph Company will rebuild its lines in this vicinity.

YANKTON, S. D.—At the meeting of the county commissioners a resolution was adopted giving the Independent Telephone Company of Yankton permission to use the roadways through the county for the purpose of setting poles for a long distance telephone line. E. A. Bruce is president, and J. J. Wagner is secretary of the company.

HECLA, S. D.—The Hecla Social Telephone Company will extend its Aberdeen-Hecla line through the township of Brainard.

CLARKSVILLE, TEX.—The Independent Telephone Company has begun construction on its exchange. It has just reached the city with the wires from Texarkana.

GALVESTON, TEX.—Nearly one-half million dollars will be spent by the Illinois Central Railroad in organizing the telephone system over the entire route from Chicago to New Orleans.

TABOR, TEX.—C. Clayton, J. Castale, J. Wiley, A. Dean, O. Wilcox and E. T. Gallatin are interested in a new line which will be built from Bryan to Cotton Wood Prairie. There will be about twenty instruments on this line.

CALDWELL, TEX.—The Trans-Texas Telephone Company has bought a controlling interest in the Deanville and Dime Box telephone line. It will extend the line to Hookerville. The company also contemplates putting in a line from Caldwell to Hix and Rita.

VIRGILINA, VA.—The Virgilina Telephone Company will extend its line to Buffalo Springs, Va., where it will secure connection with the Home Telephone Company, of Henderson, N. C., which has over 4,000 telephones in use.

WHEELING, W. VA.—The National Telephone Company, of Wheeling, will have direct connections with the Enterprise Telephone Company, of New Martinsville.

EAU CLAIRE, WIS.—The Wisconsin Telephone Company has started work on its $50,000 exchange building and underground system at Green Bay.

BELOIT, WIS.—A deal has been made between the Home Telephone Company and the Badger State Telephone Company whereby Beloit will be connected by an Indenendent telephone line with Rockford and other northern Illinois towns. This means the opening up of the whole of southern Wisconsin to the people of Rockford by telephone, as well as direct communication as far north as St. Paul, Minn.

JEFFERSON, WIS.—The Wisconsin Telephone Company is putting in a new line between this city and Helenville.

MILWAUKEE, WIS.—The Independent Consolidated Telephone Company is preparing to enter Milwaukee.

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TRADE NOTES

THE STROMBERG-CARLSON TELEPHONE MFG. CO., of Chicago, has recently closed a contract with the Royal Telephone Company, of Front Royal, Va., for a switchboard and equipment.

THE BAIRD MANUFACTURING COMPANY, of 4 Michigan street, Chicago, has just received a large order from the Independent Telephone Company, of Seattle, Wash., for its three slot pay stations and a time stamp.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., reports a continual demand for its "lightning proof" bridging telephones and its non-infringing self-restoring drop switchboard equipment for rural village exchanges and country party line systems.

FRANK B. COOK, 238 West Lake street, Chicago, reports the recent shipment of more than two hundred pole cable terminals to the Pittsburg & Allegheny Telephone Co. One hundred more are nearly completed for shipment. The Fittsburg & Allegheny Telephone Co. is using some of these terminals for its McKeesport exchange, the balance being for some of its other exchanges.

W. N. MATTHEWS & BROTHER, of 619 Carleton Bldg., St. Louis, Mo., are distributing an amusing folder. A Johnny of the don'tcher know variety is called upon to address a meeting, but his memory fails. However, he is able to make it quite plain to his audience that it doesn't require a very bright man to see the advantages of a Stombaugh guy anchor, in fact, it is simplicity itself. This folder will be mailed upon request.

THE KESTER ELECTRIC MANUFACTURING COMPANY, of 44-56 N. Union street, Chicago, Ill., has a very unique exhibit at the World's Fair, St. Louis. It is a clock 7 feet 5½ inches high, made exclusively of ordinary pins joined with Kester Self-Fluxing Solder. Over 15,000 pins were used in its construction, and it weighs 40½ pounds. Mr. F. G. Dickerson, secretary of the company, designed and executed this remarkable piece of work.

THE HARVARD ELECTRIC COMPANY, 62 West Van Buren street, Chicago, has been manufacturing telephone fuses, lightning arresters, etc., for nearly fourteen years, and is one of the pioneer manufacturing companies in the telephone field. The fact that it has been in business so long and with a constantly increasing trade is good evidence that its line of telephone arresters is meritorious. A new catalogue, No. 14, is now ready and will be mailed upon request to all who mention THE AMERICAN TELEPHONE JOURNAL.

G. M. GEST, the expert subway contractor, has been awarded a contract by the Toronto Railway Co., Toronto, Can., for the construction of its underground subway system, covering the main thoroughfares of the City of Toronto. Work is to be completed as soon as possible, and a large force of men will be employed. This is part and parcel of the many improvements inaugurated in the reconstruction of the electrical equipment of this railroad, which is being changed in all respects to make it absolutely modern and up to date.

THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY, of Meriden, Conn., has made a special offer on its solid back transmitter and will mail new customers one sample by mail prepaid for $1. This offer is for a short time only. The company has made many of its customers in this way. This transmitter is scientifically and carefully constructed and is guaranteed not to pack or deteriorate with years of constant service. The tones are perfect and it has great volume. It is also moisture-proof. The company states that it has secured a permanent customer whenever one of these transmitters has been sold. Its new and enlarged catalogue is now ready and will be mailed on request.

JULIUS ANDRAE & SONS, Milwaukee, Wis., have recently issued their catalogue No. 10, which deals very thoroughly with the switchboard apparatus and instruments manufactured by this company. Particular attention has been given to the design of the various pieces of apparatus, all of which carry a first-class guarantee. The company claims to spend more money on its assembly than any other manufacturer, and has acquired the reputation of sending out nothing but perfect apparatus. All the cabinet work is taken from selected stock and skilfully put together. Wiring connections are made in the very best possible manner, and every precaution is exercised in the testing of the apparatus. Particular attention is drawn to the giant generators, which the company claims to be the most powerful on the market. Various types of switchboards are thoroughly described, together with the four party selective signalling system, which this company advocates. This catalogue will be sent upon request.

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Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—Eureka Electric switchboard, 200-line capacity; now in use; can be delivered after September 1st. Will sell cheap. Address, W. M. Clark, Baldwin, Kas. 221

FOR TRADE.—Good farm, well improved, 241 acres; value, about $12,500; for paying telephone plant. Address, Box 457, Oxford, Ohio. 218

EXCEPTIONAL BUSINESS OPENING.—Want to meet a man or syndicate that can invest $20,000 cash at once and can furnish credit promptly to the amount of $80,000 more in a telephone proposition near Kansas City, Mo., with or without service. Address—with reference, no agents—Theodore Gary, Macon, Mo. 207

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GILDART BROS., Albion, Mich. 168

I WANT TO LEASE a telephone plant in a live, prosperous city; one that is not earning up to expectations. Can make it pay good interest to owners. I have references and money to back me. Address, Box 219, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 219

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

POSITION wanted with telephone company in Colorado or Arizona. I have had three years' experience and am an expert lineman and repair man. References furnished. Address Box 206, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 206

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

POSITION WANTED as switchboard and instrument expert. First-class lineman. Nine years' experience. References furnished. F. E. Z., Box No. 8, Lisbon, Iowa. 217

UP-TO-DATE MANAGER, who has increased plant two and one-half times in two years, contract expires Sept. 1st, would like to change. Address Box 216, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 216

POSITION WANTED as superintendent or manager of any size exchange, magneto or common-battery, practical experience in all branches, best of references. Address P. O. BOX 690, St. Louis, Mo. 215

POSITION WANTED.—Age 25; married; five years experience; want superintendency where I can work. Address, Box 220, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 220

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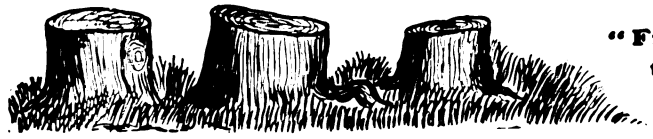
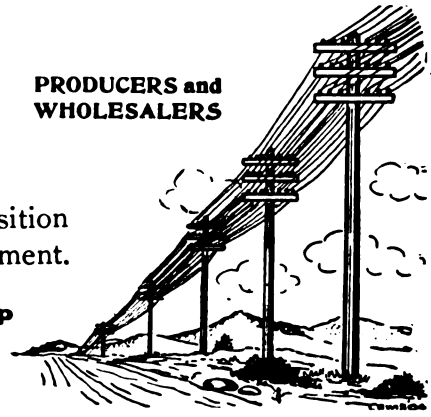


"From the Stump to the Line."



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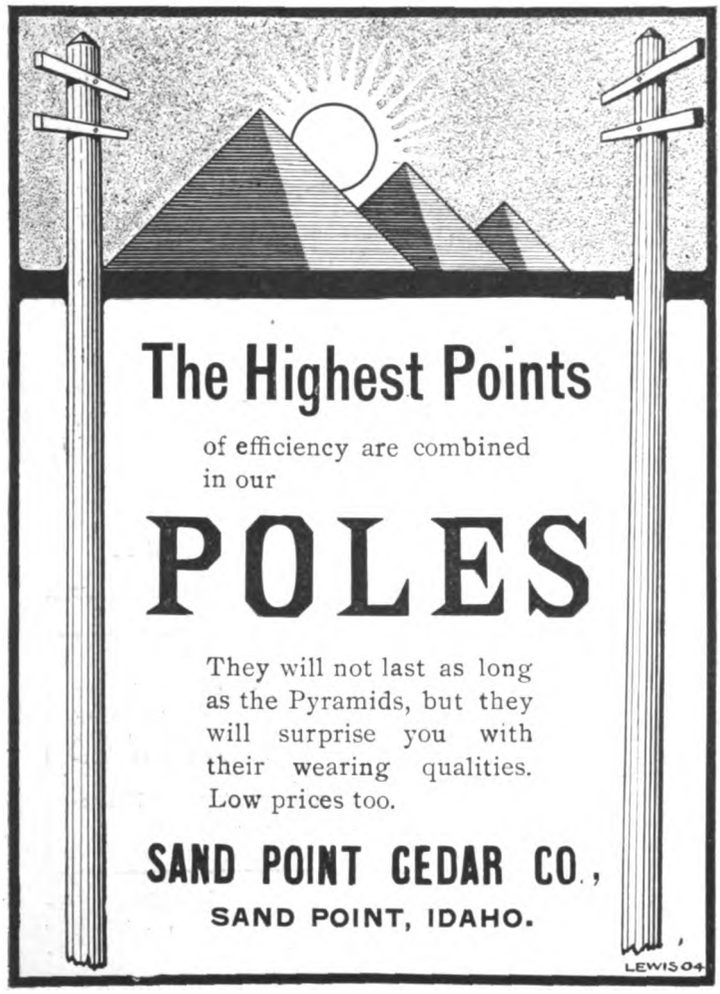

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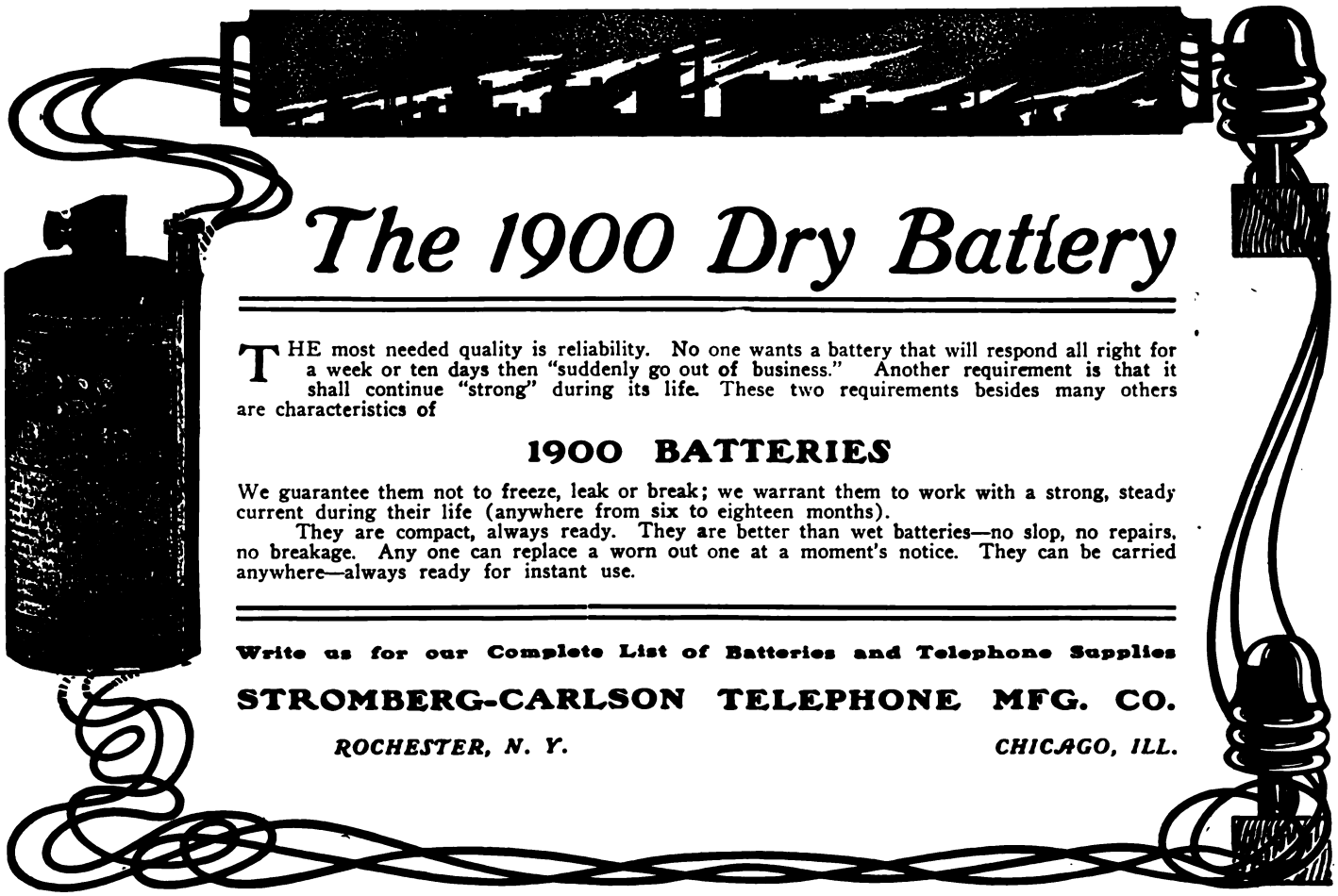

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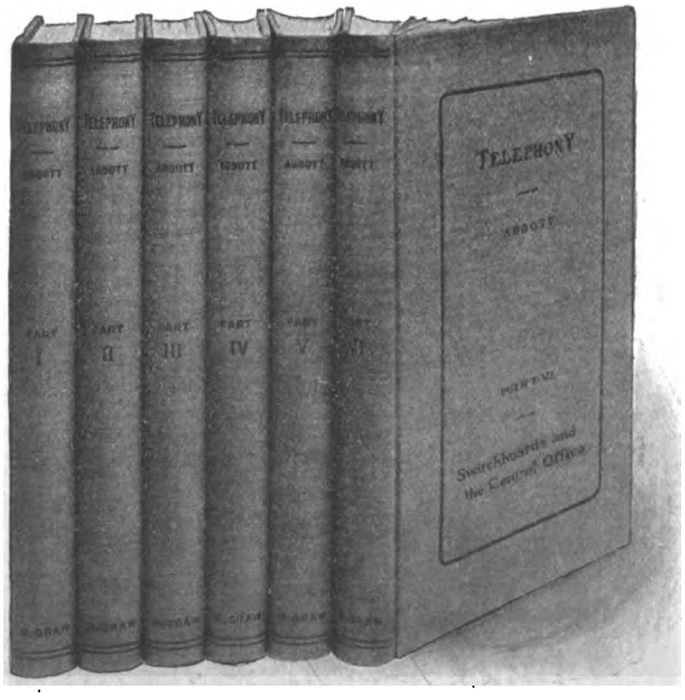

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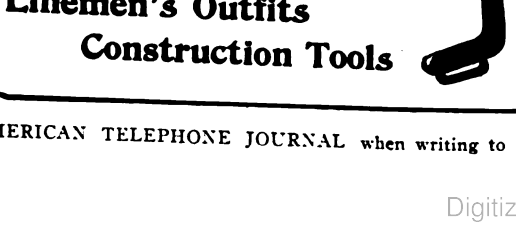

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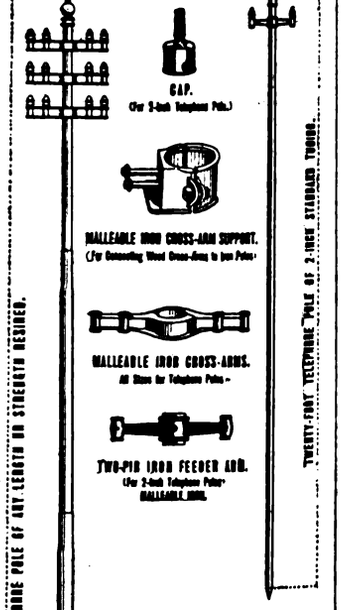

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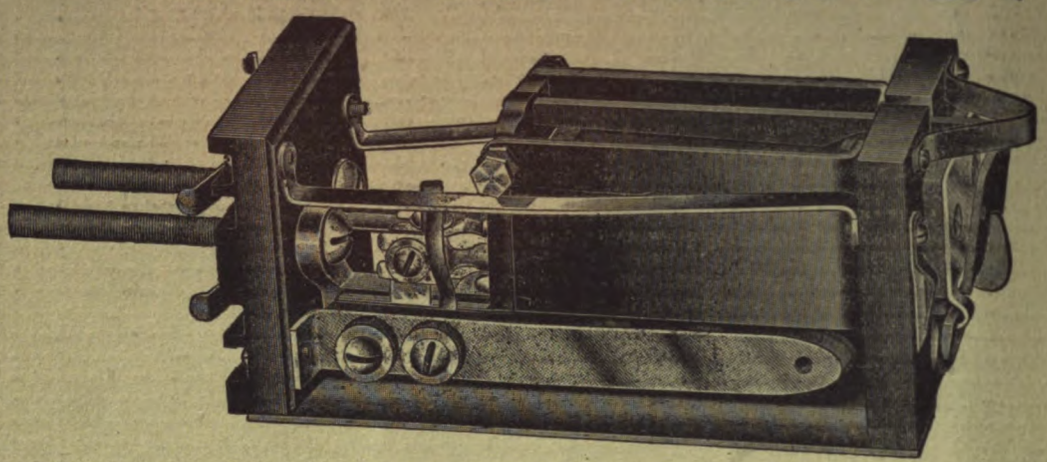

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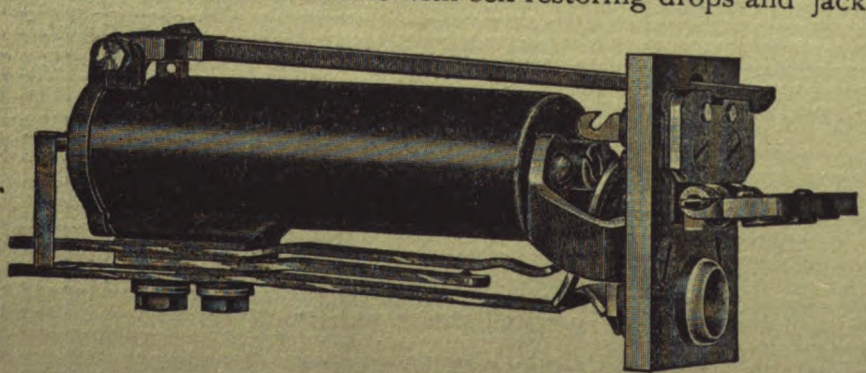

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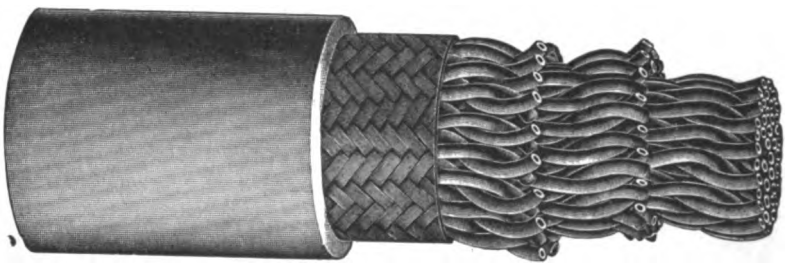

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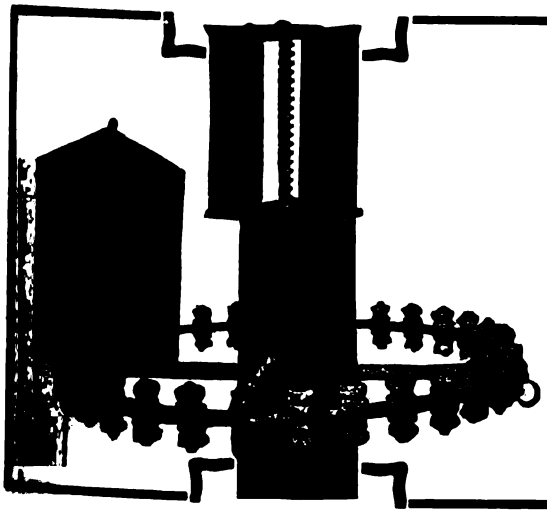

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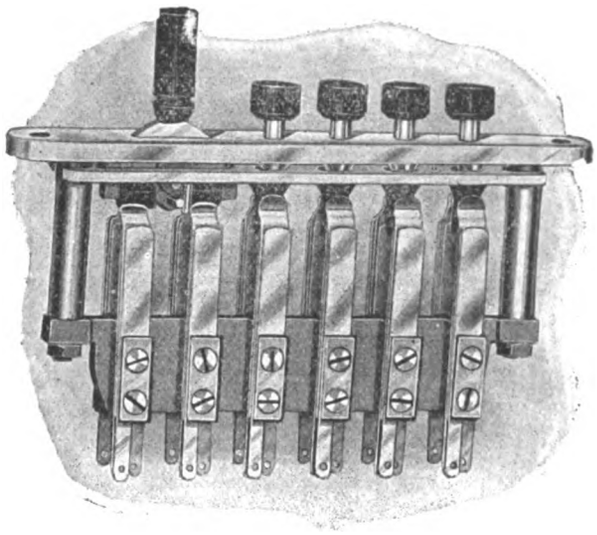

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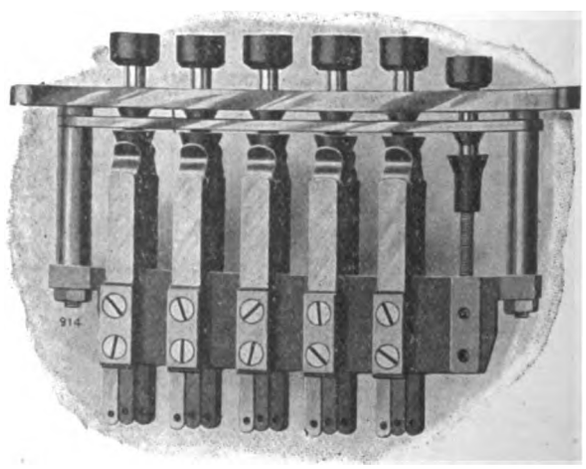

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WHITNEY INSTRUMENTS ENJOINED

Full opinion of His Honor Judge Wheeler, concurred in by His Honor Judge Lacombe in the case of the

WESTON ELECTRICAL INSTRUMENT CO., Complainant

vs.

WHITNEY ELECTRICAL INSTRUMENT CO., Defendant

This suit is brought upon patent No. 392387 dated November 6, 1888, and granted to Edward Weston for an Electrical Measuring Apparatus, which was adjudged to be valid in Weston Electrical Instrument Co. *vs* Jewell Electrical Instrument Co. et al in this Court in March, 1904. It has now been heard upon a motion for a preliminary injunction.

The principal question made now is as to infringement. **The parts of the defendant's instrument look quite differently from the corresponding parts of the instrument of the patent, but notwithstanding these differences in form they are there in the instrument and do the same things in substantially the same way.** This appears quite well from the description of the two instruments in parallel columns in the affidavit of Frank W. Roller, defendant's record on this motion, page 3. The great thing to be done appears to have been to get the movable coil in its diamagnetic frame into a permanent magnetic field, compactly, and to carry the current to be measured from side to side through the coil, and move the coil against steady resistance to measure the current, and record the measurement. Weston seems to have accomplished this by mounting the frame by pivots on non-conducting bridge-pieces, and carrying the current to be measured to and from the movable coil through springs connected with the frame furnishing steady resistance, and a pointer connected with the frame and moving over a scale to show the movement and the measurement of the current.

Any electrical mechanic could provide the permanent magnetic field, and the form of it would not be material except to permit the movement of the frame carrying the coil. The mounting of the frame on the bridge-pieces by pivots with its arrangements and connections was the important part of Weston's patented invention.

The defendant's instruments have the permanent magnetic field provided by a magnet and core of different and perhaps better shapes in some respects, but permitting movement of the frame in an arc of a circle to carry a pointer moving over a scale to indicate the measurement of the current. **If these changes of forms are even patentable improvements the defendants have taken and used the invention of the patent in making and using those improvements.**

The difference in the form of the parts carrying the frame on pivots supported by the bridge-pieces is of the same sort. It does not vary the mechanical operation of the parts. **These differences do not, any or all of them, amount to doing the same thing in different ways, but leave the operative parts doing the same thing in the same way.**

According to these views the motion should be granted.

HOYT H. WHEELER.
Judge.

FOR PLAINTIFF:
WILLIAM HOUSTON KENYON.
FOR DEFENDANTS:
CLIFTON V. EDWARDS.

Upon re-examination of the record, I concur in the opinion above expressed by Judge Wheeler.
July 18, 1904.
E. HENRY LACOMBE,
U. S. C. J.

(ENDORSED) Circuit Court of the United States, for the Southern District of New York.—Western Electrical Instrument Company *vs.* Whitney Electrical Instrument Company *et al.*—Opinion, WHEELER, J. —United States Circuit Court, Southern District of New York. Filed July 20, 1904.
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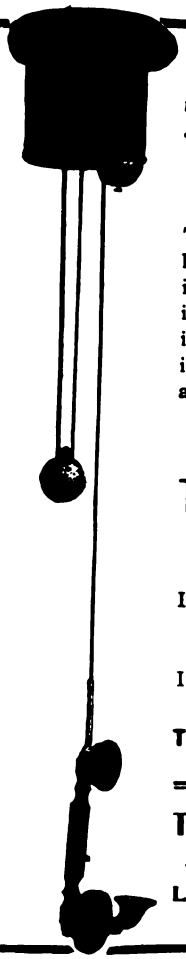

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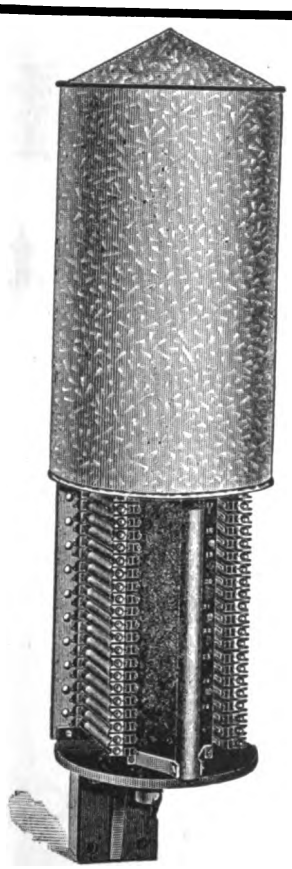

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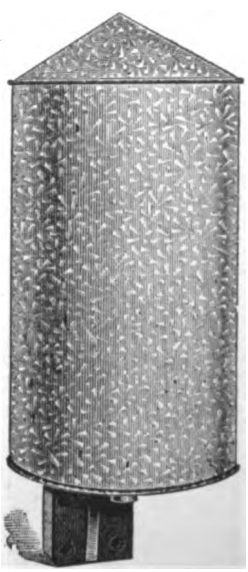

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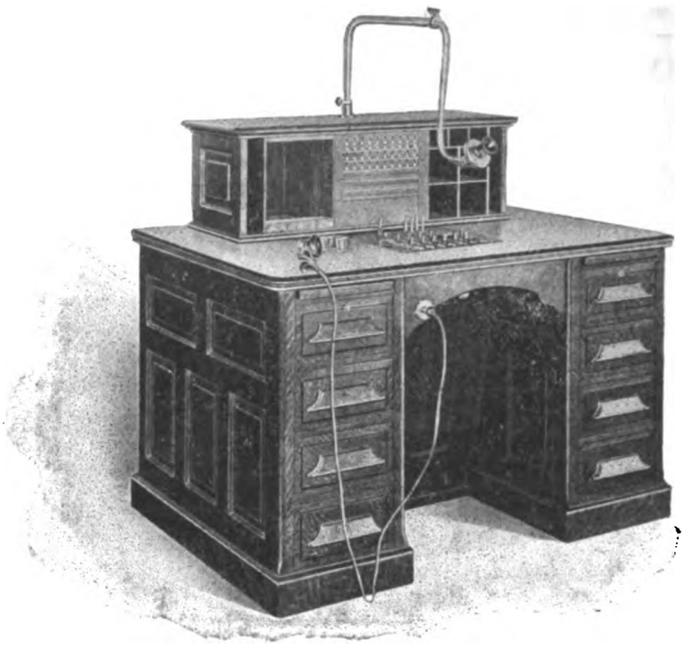

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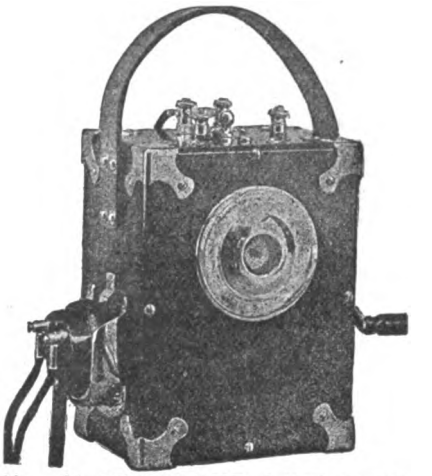

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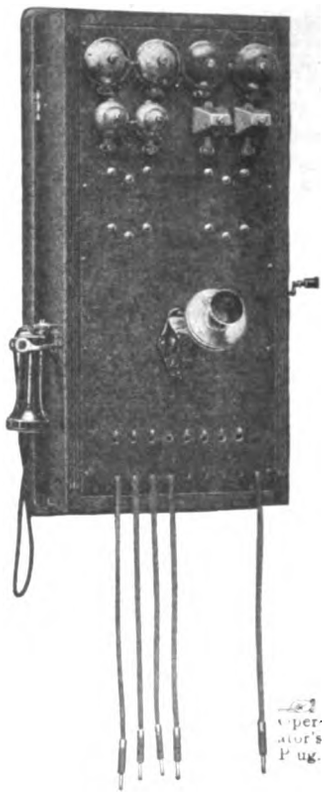

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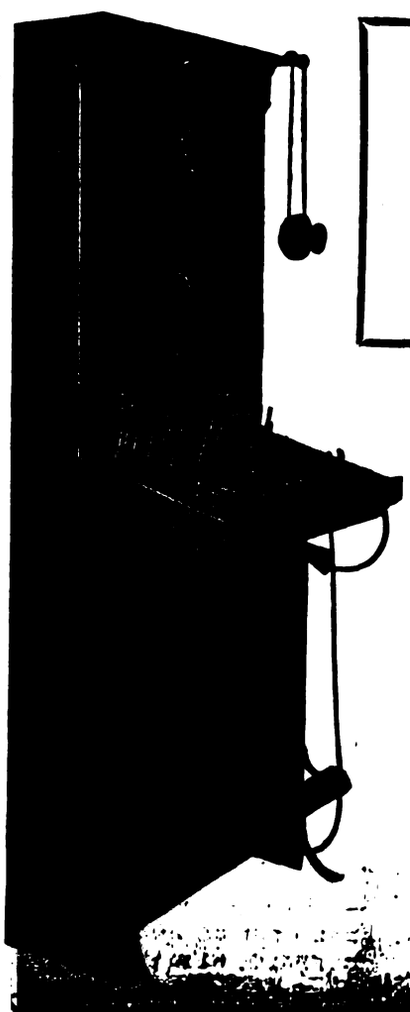

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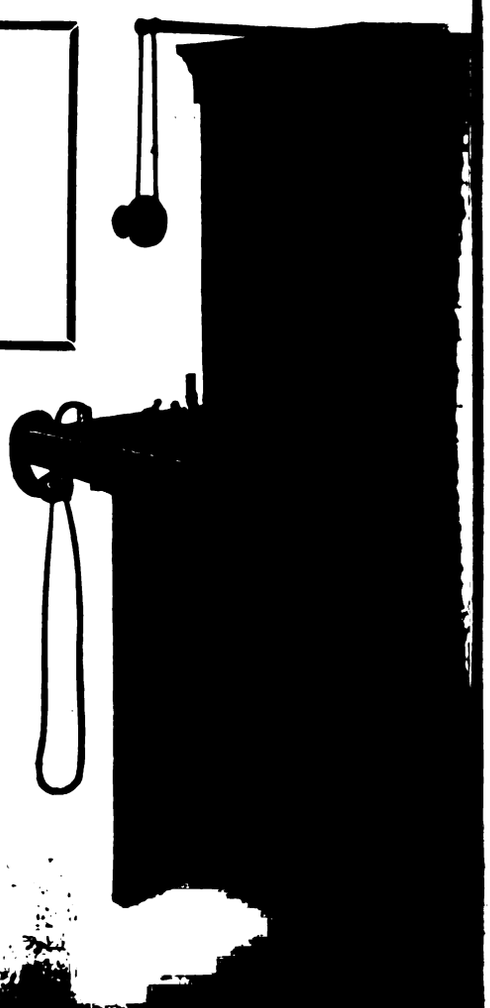

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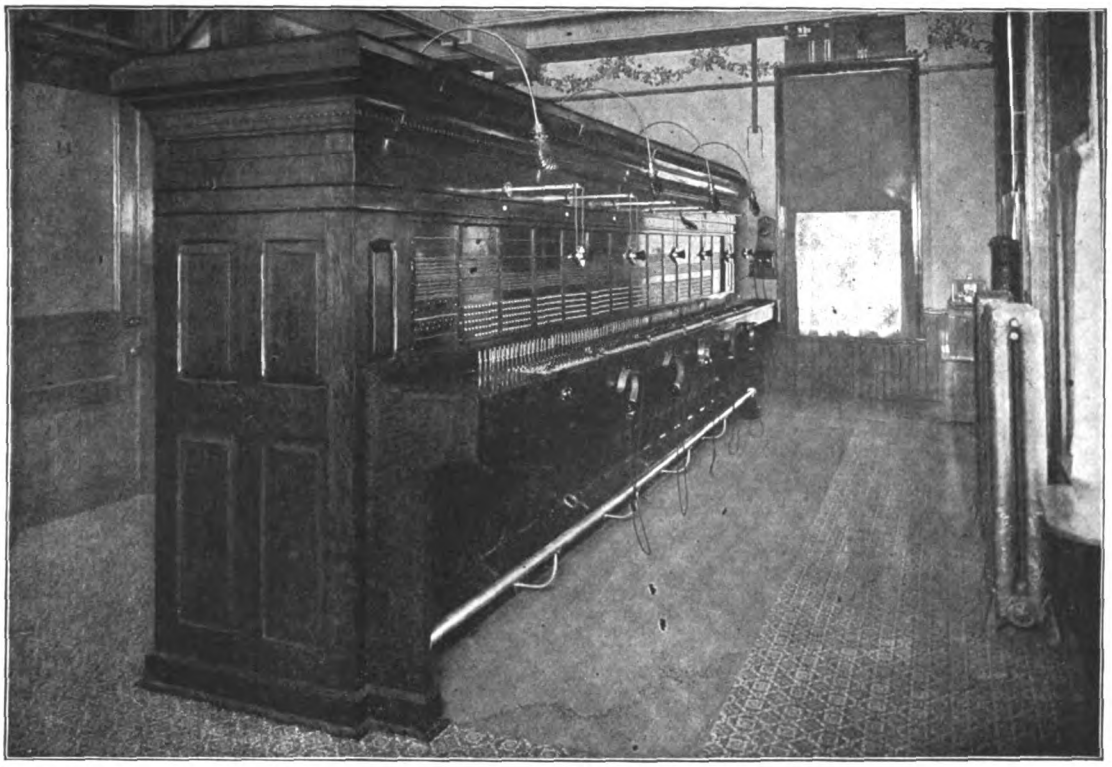

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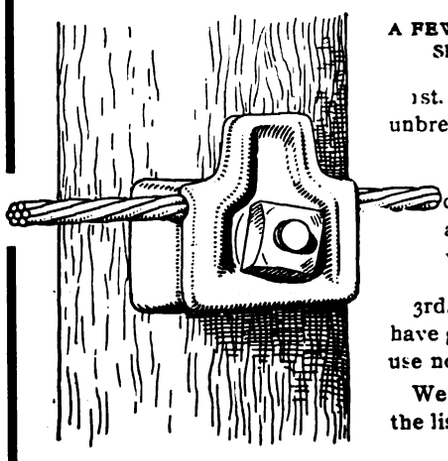

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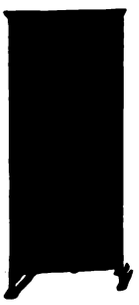

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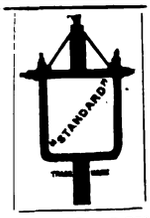

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VOLUME 10 SATURDAY, AUGUST 13, 1904 NUMBER 7

A TOLL TESTING SET.

By P. Kerr Higgins.

In testing toll line circuits a much larger degree of accuracy is required than is usually found necessary for the ordinary circuits. It must not be understood, however, by this statement that any less vigilance is required for tests for faults on local lines, but that in the case of toll line circuits there are conditions to be met and overcome that are hardly noticeable in the subscriber's lines or in any of the switchboard circuits.

Balance, induction, and capacity, are factors in toll line working which must be thoroughly understood to allow of any successful operation. In the case of a local circuit it is a comparatively easy matter to locate faults and to apply the remedy, but in the case of long toll lines, as any experienced manager or wire chief knows, the bug upon the line is as evasive as the average fly and a good deal harder to locate and kill.

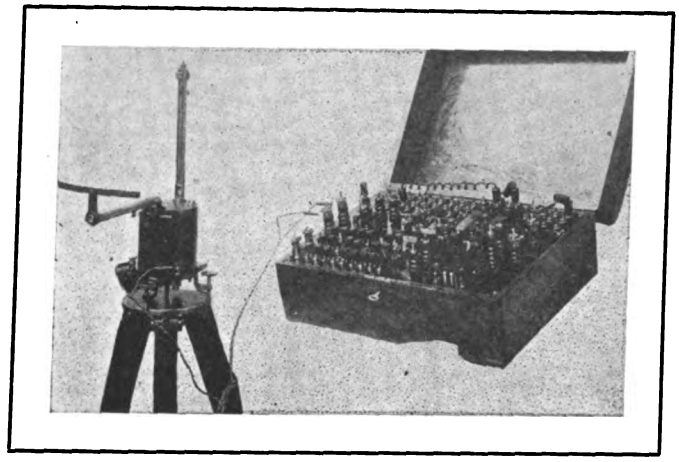


Fig. 1. Galvanometer and Bridge.

Some toll lines are as nearly perfect from the transmission standpoint as possible in a dry atmosphere, but let the weather become damp or rainy, then the lines are unworkable on account of noise. Other toll lines which in dry weather are very poor in transmission qualities are improved a hundred per cent. by wet weather. To find out the cause of these discrepancies, and to locate the position of other troubles, such as grounds, shunts, opens, etc., necessitates very accurate measurements for several reasons, the most important one of which is the saving of time.

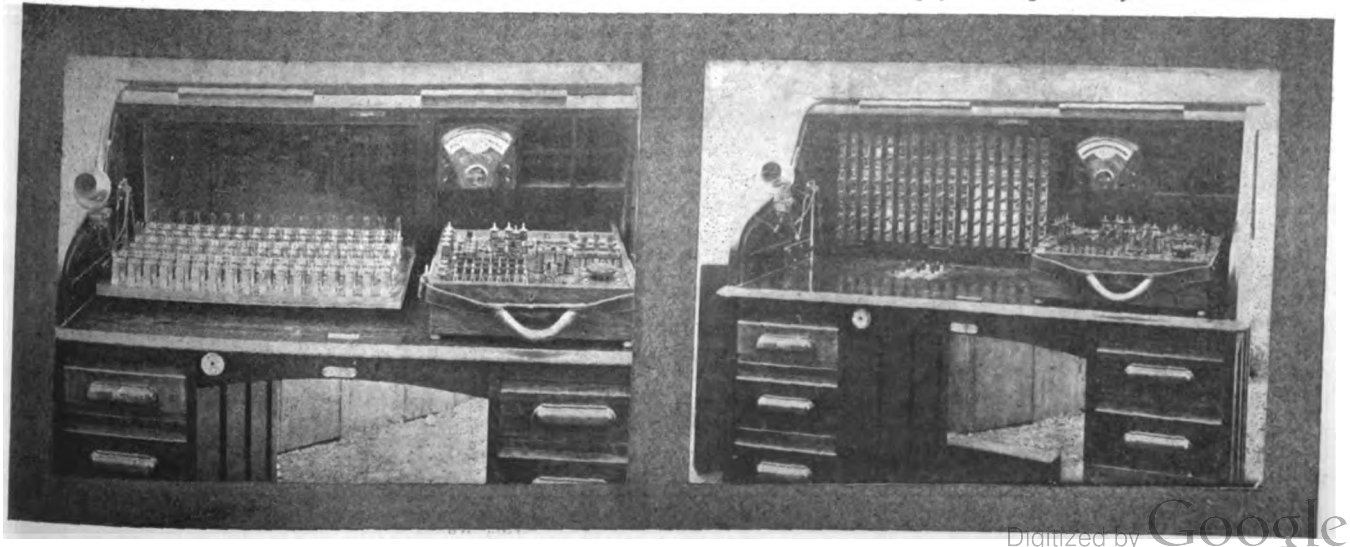
As an example, a toll line, say, fifty miles long on a listening test, becomes periodically noisy; the voltmeter indicates a swinging ground; the question for the wire chief to decide is the approximate location of the trouble, so that the lineman nearest the location of the fault may be sent to clear it. In a case like this, location is everything, for it is obvious that to send a man out from the office to go over the line would be a great waste of time and unnecessary cost not only from the point of maintenance, but also from the damage that poor trunk or toll line service does to a system.

To meet the demands of testing suitable for toll line work the writer designed the desk shown in Figs. 2 and 3. Amongst other special features might be mentioned that the circuits and keys are so arranged as to permit listening in on a toll line to see if in service and also to cut the line in two, to permit of testing and locating the trouble whether in the office or on the line. This is done by a double key, the upper portion being for listening in on line and is non-locking. The lower when in the normal position (straight up and down) connects the Central Office toll desk with the toll line. By pressing the key down or up as desired, the line is divided into two parts for testing purposes and the key in these positions is locking. The keys on the flat part of the desk are for cutting in the telephone, the voltmeter, testing battery and Wheatstone bridge at will. A reversing key for throwing battery out on either side of the line and for grounding is also provided.

With the apparatus is furnished a standard Weston direct reading voltmeter with two scales, reading from 0 to 15 and 0 to

Fig. 2. Showing Arrangement of Key Bank.

Fig. 3. Showing Desk Keys.



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150 voles, respectively. The telephone instrument is an Adjustaphone, as will be noticed in the cut and the Wheatstone bridge is of the Queen pattern and is used in conjunction with the D'Arsonval dead beat galvanometer illustrated in Fig. 1. This galvanometer is only used when fine testing is necessary, and for all ordinary work the voltmeter or a head telephone is used. The whole apparatus is so arranged that it can be locked up in the desk when not in use.

The desk was constructed in the shops of the Home Telephone Company at Los Angeles.

The general arrangements of the circuits, shown in Fig. 4, possess some points of interest. Special provision is made for testing for unbalanced conditions by using a receiver bridged across

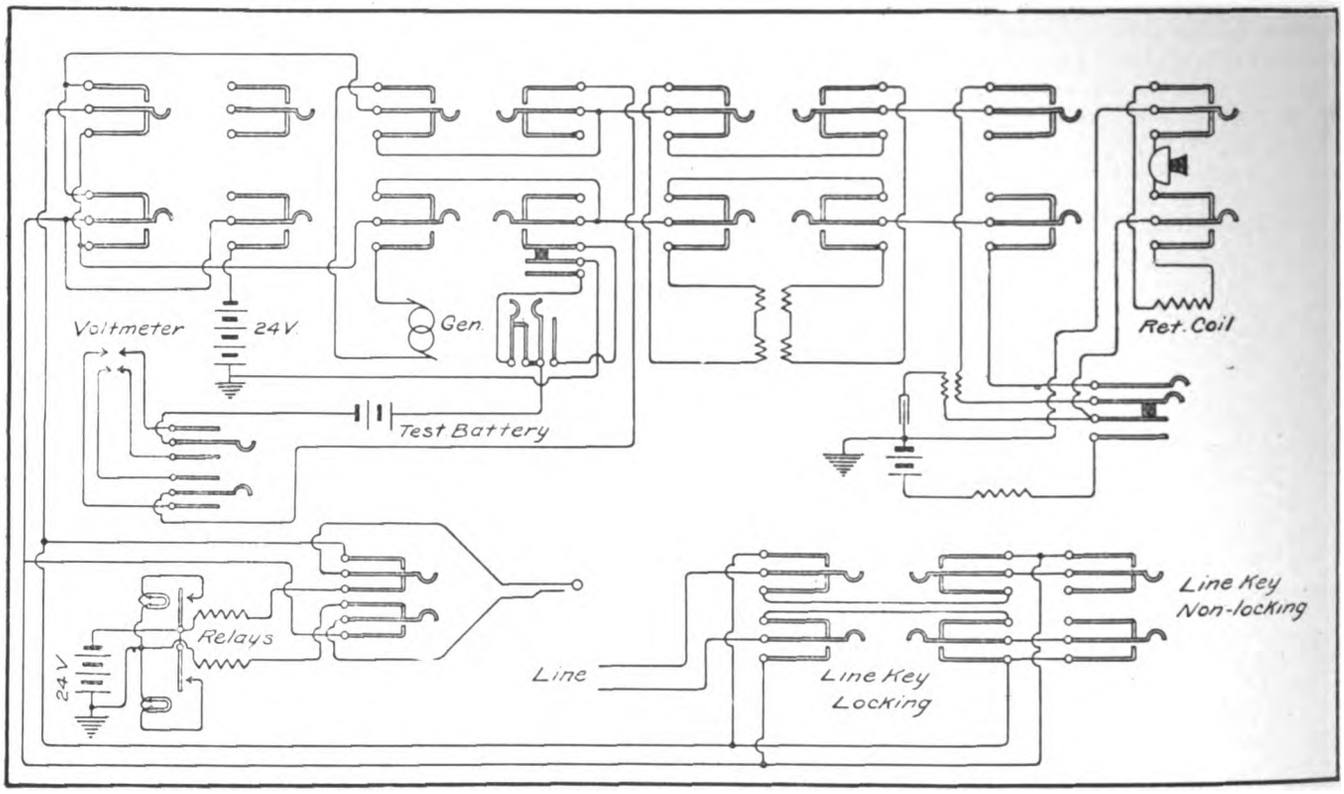

Fig. 4. Circuit Arrangement.

with 500 ohms on any line. This is also used for observing talking efficiency. The desk is used and operated by the wire chief, so that the special services of an extra man are not necessary. The main feature in the design of the apparatus was to secure the maximum efficiency with the minimum of complications. Since almost all circuits possess some arrangements which are not always clear a large amount of time and thought was given to secure the deserved quality of simplicity combined with speed in operation. That this has been accomplished to a great extent is evidenced by an operator being able to test each and every of the fifty toll lines in less than five minutes. A record is taken of all the bad lines, which is a policy of the utmost value and a guarantee of expediency, and these are taken up separately later, the faults being examined carefully and more elaborate tests are made to locate the exact nature of the trouble and its approximate distance from the testing station.

The preliminary test of all the lines is made by placing the voltmeter key in the testing position and pulling down the key on each line one after another. A predetermined reading on the voltmeter scale indicating low resistance.

In the circuit drawing it will be seen that the large and small scales of the voltmeter are connected to a special key. This allows a rapid interchange of tests for certain troubles. The line circuit is separate until pulled into the testing position, the testing apparatus being common to all keys.

With this arrangement of test circuits it is possible to locate almost any fault that may occur on a toll line and also determine its extent and position with a very large amount of accuracy and dispatch.

TELEPHONE TAXATION IN INDIANA.

THE relative conditions of the Bell and Independent companies of Indiana were put forcibly before the tax commissioners of that State on July 22d, when Mr. Theodore Thorwald, president of the South Bend Home Telephone Company and of the Indiana Independent Mutual Telephone Association, called the attention of the board to the extremely inequitable tax rating now prevailing. Mr. Thorwald pointed out that the State Bell corporation, the Central Union Telephone Company, was assessed $56 per mile of toll line, while the Home Company was obliged to pay $90 per mile, although the earnings of the Independent toll lines were below those of the Bell.

Mr. Thorwald then stated that seventy-five per cent. of the money put into Independent telephones in Indiana was placed there not as an investment, but with the intention to relieve the people from the Bell monopoly. The speaker called attention to the well-known free-rate tricks of the Bell during a competition, and the quick raising of prices after that company had re-established its monopoly in a particular place.

"In Fort Wayne," said Mr. Thorwald, "the Central Union Company did not even ask for a general franchise, but simply for the franchise on the main streets, where it was easy to locate telephones. If a man on a side street wanted a telephone he could not get it. As a consequence, the Home Company, of Fort Wayne, was incorporated by the citizens, and has given to

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poor and rich alike a telephone service at reasonable rates. In fact, it has benefited the people of Fort Wayne more than its stockholders.

"At South Bend," continued the speaker, "The Home Company is the real successor of a previous Independent concern, the Citizens', which was first weakened by competition and then bought in by the Bell interests.

"When the South Bend Home Company was organized, we had to build toll lines to the surrounding counties to connect with the Independent telephone companies. At present we have about 500 miles of toll lines. We believe that if the State must receive a certain amount in taxes, it ought to receive it to from the Bell monopoly, which represents foreign capital sent in the State for the purpose of depreciating home institutions. The Bell company just now is making its hardest fight against our Independent telephone companies, claiming that with its $20,000,000 of extra capital it will either force the home companies to sell or will crush them out of existence with free service. The stockholders of the Independent telephone companies are Indiana taxpayers and citizens interested all over the State in other industries besides the telephone business, and we believe that the tax board ought to take this fact into consideration."

THE INDEPENDENT TELEPHONE ASSOCIATION OF OHIO

AT a meeting of the Independent Telephone Association of Ohio, held at Columbus last week, steps were taken for the formation of a national association, composed of all Independent telephone interests in the United States and the standardizing of equipment with a general uniformity in plan and purpose with regard to them.

A committee of the members of the State association was appointed as follows: J. B. Hoge, of Cleveland; Ed. L. Barber, of Toledo, and Cyrus Huling, of Columbus.

At a recent meeting, the State of Ohio was divided into nine Independent districts. Meetings of these districts were called as follows: Cleveland, Aug. 16; Toledo, Aug. 17; Lima, Aug. 18; Dayton, Aug. 23; Hamilton, Aug. 24; Chillicothe, Aug. 25; Columbus, Aug. 30; Zanesville, Aug. 31, and Canton, Sept. 1.

At these district meetings arrangements will be made for the election of delegates, to represent them. This State association meeting will elect delegates to meet representatives of other State associations.

One of the drawbacks of the Independent telephone interests of the country, Independent telephone men say, has been lack of a close and representative organization. In the past there has been no organization of this kind. National meetings have been held, and the smaller companies, it is asserted, have had the same voice as the larger and more influential ones. Under the present plan it is expected to have a more general representation and at the same time so apportion the delegates that they shall have voice more according to the importance of the companies or districts they represent.

According to J. B. Hoge, one of the first things to be taken up will be the attempt to secure the standardizing of all Independent telephone equipment. Said Mr. Hoge in discussing the project: "Standardizing of equipment is one of the things that has become a most important problem for the Independent telephone interests. So long as there is such wide diversity in the apparatus and methods of the Independent companies, as exists at the present time, it is not reasonable to expect the best results. In almost every other line of business this principle of standardizing has been most successfully applied. The time has been ripe for some such move on the part of the Independent telephone companies for some time and all that has been needed is some one to give it a start. That we propose doing and shall keep at it unttil we attain results."

At the coming local meetings in Ohio, the question of uniformity will be given first attention. Investigation will be made into the trouble which may have arisen from a varied equipment and immediate steps will be urged to remedy this, when changes are made and new supplies of any kind secured.

Mr. Hoge is already in communication with the Inter-State Independent Telephone Association with the intention of getting it interested in the project. This association is made up of representatives of the various Independent companies in States of the Middle West. It will probably take up the plan at its first meeting. The old Independent association will also be communicated with and the plan presented to its members.

Another thing Ohio Independents are working for is the universal adoption of the Blue Shield as the mark of the Independent long distance lines. At a recent meeting of long distance telephone men at Indianapolis, the use of this mark was decided upon but its universal use is believed to be of great importance to the Independents.

"While I was in St. Louis the other day," said J. B. Hoge, "it seemed to me that I was confronted by 'the Blue Bell' of the Bell Company at every way I turned. And this, too, in the face of the fact that the Independents had more long distance offices than did the Bell."

A number of other things of importance will be taken up from time to time, by the proposed organization. One of these will be the question of telephone insurance now under consideration by a committee in Ohio.

Cleveland Independents expect much from the proposed organization. Quoting Mr. Hoge again: "The power and importance of the telephone interests of the United States are not fully recognized. We can get together as able and representative a body of men as any business in the country and the only thing necessary is simply to get them together. To bring these men together so that they will attract the attention of the financial and banking interests of the country, will be of great and far reaching importance to the telephone business."

The following Independent telephone men of the State were present at the Columbus meeting: Pres. F. L. Bean, of Columbus; Cyrus Huling, of Columbus; Dwight Sapp, of Mt. Vernon; Ed. L. Barber, of Toledo, and J. B. Hoge, of Cleveland, comprising the executive committee; and W. F. Laubaugh, of Akron; J. B. Rhodes, of Zanesville; Thorpe, of Wilmington; J. C. Reber, of Dayton; George Metheany, of Lima; Hamblin, of Toledo; E. E. Knox, of Portsmouth, and Reamer, of Columbus.

SEVENTEEN-YEAR ACCOUNTING.

SPECIAL MASTER EVERETT W. BURDETT, in Boston, Mass., has started hearings in the American Bell Telephone-Western Union Telegraph Company royalty suit. Five hearings have thus far been held.

These hearings are being held in accordance with the decree of Judge Colt, of the United States Circuit Court, as of February 3, 1904, ordering the American Bell Telephone Company to furnish to a master an accounting to determine to what extent it is obligated to the Western Union for failure to turn over for seventeen years 20 per cent. of the stock and dividends it received from sub-companies in addition to 20 per cent. of the cash rentals.

The rental and royalty contract was made between these companies in November, 1879, and the Western Union Telegraph Company. The amount involved is variously estimated at between $2,000,000 and $4,000,000. In return for the royalties and rentals the Western Union agreed to go out of the telephone business, and turned over all its telephone property to the Bell Company, the latter also agreeing not to interfere with the telegraph business.

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THE NEW PITTSBURGH & ALLEGHANY EXCHANGE AT McKEESPORT.

By H. A. Lane.

ALTHOUGH Independent telephony has made its greatest strides in the States of Ohio and Indiana, yet Pennsylvania is not far behind in the matter of up-to-date exchanges with independent toll lines which give the major portion of the State a moset efficient telephone service. Of those systems which have made this state of affairs possible, the Pittsburg and Allegheny Telephone Company is one of the foremost. This company's system of exchanges radiate in almost all directions from the city of Pittsburg and in every case they represent the most modern method of telephone engineering. The new plant of the Pittsburg and Allegheny Company which is the subject of our article, is an illustration of the thoroughness with which this company conducts its business. It might be said here, that not a small portion of the excellent results that have been achieved by it in competition with the Bell systems operating in this territory, is due to the foresight of the engineers in providing for expected and unexpected growth and in making the system as nearly perfect as possible.

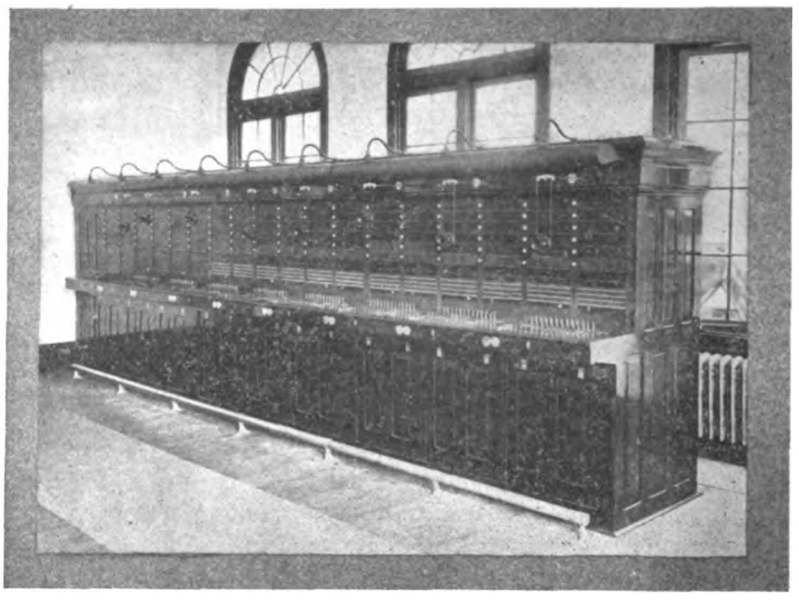

Fig. 1. Main Switchboard.

considering the cost of a system to curtail in some manner, the expense with the idea that that part of the system which has been omitted to secure a financial saving has been of little value. Innumerable instances could be pointed out where the tendency toward the "penny wise and pound foolish" idea has been the ruination of not only Independent but Bell companies as well. It is, therefore, with great pleasure that one is able to look upon a system such as this to investigate its merits and to find, when tried in the balance, it is not found wanting in any of the necessary essentials or general apparatus, which collectively represents the equipment of a first class system. The motto which should represent Independent telephony is well expressed in the old time-worn, but still valuable phrase: "Nothing is worth doing unless done well." The most modern idea as regards achitectural design, as applied to telephone buildings, have been drawn upon extensively in the design of the building illustrated in Fig. 3. Perhaps one of the most necessary qualifications of an up-to-date telephone building

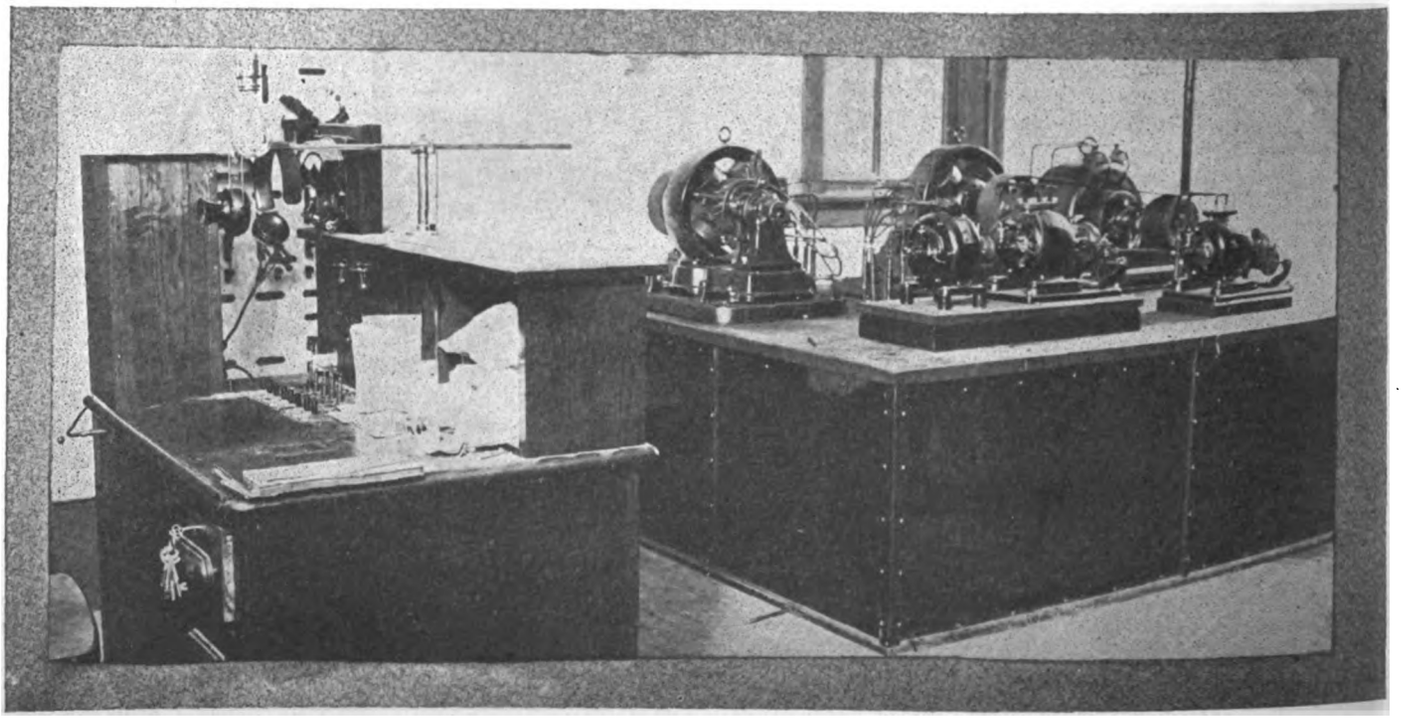

Fig. 2. Wire Chief's Desk and Power Apparatus.

Although the plant has been built with remarkable rapidity, no details which make for economy in operation, flexibility of system or the comfort of the employees have been overlooked.

It has often been the custom of Independent companies when is a maximum amount of light and, secondly, hygienic conditions which allow of perfect ventilation.

That this has been secured in this case is evident from the location of the building which is open on all sides. The structure

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itself is fireproof throughout, being constructed of brick and Indiana limestone, of the best quality. The floors are of hard wood with a highly polished surface, and the general impression created by an inspection of the building and its interior, is at once both cheerful and artistic. A large basement has been provided for general storage purpose, and which incidentally serves as a general utility room. The first floor front, is devoted to the general offices, which are fitted up in a first-class manner, to suit the business requirements of the company.

To the rear of the offices are located the main distributing and intermediate frames, which are illustrated in Fig. 4, and the power plant and wire chief's quarters, which are shown in detail in Fig. 2.

As this department is one of the most important in connection with a telephone system, every precaution has been taken to provide for the quickest and most efficient tests with the highest grade of apparatus necessary for this class of work. Attention is called to the arrangement of the power plant which in certain respects in its installation presents some features which are worthy of second consideration. The point to which we call

be obtained is by the cordial co-operation of employer and employees.

McKeesport is situated southeast of Pittsburg and is the center of the mining and coal industry of that part of Pennsylvania. It has a population of about 40,000 which is rapidly increasing. The Bell company which operated in this town for more than 15 years, was unable to secure more than 600 subscribers, whilst the Pittsburg and Allegheny Company within three weeks, secured over 900 subscribers. This is but another illustration of the now familiar situation which is constantly presenting itself where an Independent company has secured a franchise and presented the right sort of service to the patient and long suffering public.

In anticipation of this remarkable demonstration as to the need of an Independent system, the Pittsburg and Alleghany company has made ample provision for the possible growth in the near future of this exceedingly fertile field.

It has constructed more than four miles of underground conduit containing over 150,000 feet of duct, terminating in large and roomy manholes. The smallest cable leaving the office contains 400 pairs of wires. Outside of the underground district, the town

Fig. 3. Exchange Building.

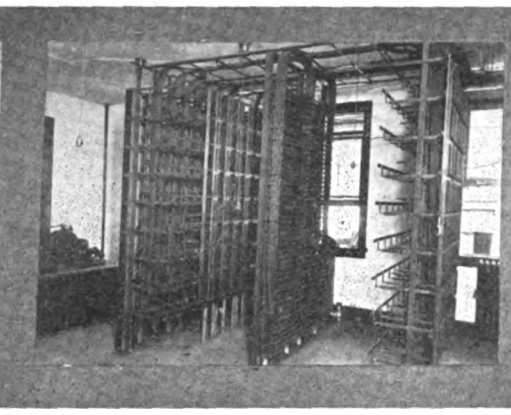

Fig. 4. Main and Intermediate Frames.

Fig. 5. Dining Room.

particular attention is the accessibility of the various machines to ready handling and inspection. Frequently, power plants are installed without any respect to their subsequent operation other than the supposition that when once installed they should run without further adjustment, consequently they are apt to be placed in some dark corner where it is difficult to make repairs rapidly when necessary. Another consideration is that when installed under such unfavorable conditions, they are not liable to receive the amount of attention necessary, consequently the rate of deterioration due to accumulations of dust and oil upon the various parts, is necessarily much more rapid than when placed where they are easy of access and in full daylight.

The storage batteries are placed in the same room but partitioned off in such a manner as to effectually prevent the fumes which constantly arise from the cells to reach any of the delicate mechanism in their neighborhood. Special provision in this respect, has been made for a thorough ventilation of the cabinet in which the cells are installed.

The main switchboard and long distance toll board are installed in the front of the building on the second floor, see Fig. 1, while five rooms in the rear of the second story are for the exclusive use of the operators. These include a recreation room, Fig. 5, dining room, retiring room, toilet room, and lockers.

It seems in this instance that the problem of social economics is receiving the attention that should be expected in a large modern exchange. The time saved and the additional work obtained from employees by liberally providing for their welfare in the way of noon lunches and recreation, assume the practical character of an investment, the returns from which are greater in many respects than an equivalent investment could produce in any other department of a telephone system. First class service is the sure road to dividends, and the only way in which it can

has been completely poled with heavy chestnut poles. The cables terminate in special can-type terminals designed by the company and constructed by F. B. Cook, of Chicago, which contain fuses, arresters and ground plates.

Practically all the company's business in McKeesport will be conducted on the measured service basis; five cents being charged for local calls. The company has just commenced to give service and is now installing telephones at the rate of 50 a day. These subscribers are put in immediate communication with approximately 15,000 telephones, connected with the other 23 exchanges of the P. & A. company in Allegheny County, and with every other Independent exchange from Toledo, O., on the west, to Erie, Pa., on the north, Altoona, Pa., on the east, and Cumberland, Md., Waynesburg, Pa., and Wheeling, W. Va., on the south, aggregating approximately 200,000 telephones.

This exchange in the opinion of telephone experts, is pronounced to be equal to any in its completeness and convenience. It has been built under the personal direction of J. G. Splane, president, and Sidney Hand Browne, vice-president and general manager of the Pittsburg & Allegheny Telephone Co.

The citizens of McKeesport have every reason to be proud of the energy and enterprise displayed by the able president and officers of the Independent company. That they appreciate the immense advantages to be gained by this refreshing change from the overpowering and unprogressive policy of the Bell company to the liberality and fair dealing of the Pittsburg & Allegheny company, is obvious from the rapid rate at which contracts were signed by all the business houses in the city.

The extensive toll system of the company, which radiates in every direction, places the patrons of the McKeesport exchange in direct touch with all the Independent systems in the States of Pennsylvania, Ohio, and Indiana.

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AN INNOVATION IN EXCHANGE MANAGEMENT

THE telephone has long since been recognized as an indispensable element of business life, but the rapidity with which its use in the home has developed has brought it to the front as an invention of the greatest domestic importance, as well. Therefore, it is with the greatest gratification that we hear of the demonstration given by the public when the Toledo Home Telephone Company sent out invitations to a reception given at its exchange; an invitation which included all the people of Toledo and which was so well attended that accommodations were tested to their utmost by an interested and enthusiastic crowd of visitors. The buildings was laid wide open, and from ten in the morning until nine at night for two consecutive days demonstrators and guides were busily employed showing the people the inner mysteries of a telephone exchange.

There is one fact to be noted about the American public and that is the remarkable interest it takes in all engineering and scientific demonstrations, and on the occasion of this reception it fully bore out this reputation.

The average visitors may have gone away from the company's well appointed offices with a rather confused idea of cables, and currents, switchboards, plugs, receivers, storage batteries and connections, but he will have for some time a lively recollection of the uniform courtesy of the employees, their painstaking efforts to explain things and the business-like air which prevailed, in spite of the fact that "company" was there in swarms.

The Home switchboard is one of the best in the country. At the busy time, 75 operators are required to handle the business. They have a 15-minute rest, morning and afternoon, in addition to the luncheon hour at noon, working nine hours a day in all.

Every visitor at the exchange received a copy of an attractive little booklet, prepared by Mr. Hamblin and Mr. Stinson, in which the purpose of the public reception is very cleverly outlined. This little book, "Let's Talk it Over," gives some rather startling figures concerning the amount of business handled by the exchange. One astonishing item is the fact that the information operator handles every day the enormous average of 20,000 calls. These calls are the result of changed addresses, new telephones installed that do not appear in the directory, similarity of names and similar trifling details which tend to confuse the subscriber. The average day's total number of calls handled in the office is something like 152,000, and these 152,000 calls are largely congested into eight hours or less.

As an illustration of the immense value of system in a case where chaos would result unless intelligence and method always prevailed, the great switchboard of a modern telephone exchange is the most remarkable example on record. To the general public the comparative silence of the operating room is a source of never ceasing wonder.

In Messrs. Hamblin and Stinson's booklet they remark as follows: "The strongest impression you will receive when visiting our operating room, is the entire absence of clatter and noise. Think of one hundred girls all talking at once, but in such soft tones that the volume of their united voices does not produce a sound that can be heard two feet away."

The Toledo Home Telephone Company's switchboard is of the most up-to-date construction in the United States, and represents a marvel of efficiency and completeness. The present capacity of the switchboard is 12,500 lines and the number of lines in actual use amount to 7,000. A great dead of data can be supplied with reference to this switchboard and its equipment, but the salient facts are well represented by the following figures: The number of "Multiple Jacks" is 182,000 and "Answering Jacks" 7,500. There are 1,950 "Trunk Jacks." The total number of "Spring Jacks" therefore reach the interesting figure of 191,000. The number of underground wires reach a total of 19,600.

The Toledo Home Telephone Company is not in any sense a philanthropic institution, but the management believes firmly and heartily in the value of pleasant surroundings and considerate treatment for its employees. They take no credit whatever for the little conveniences with which their working force is provided. It is purely a matter of getting the best possible service from every one in their employ. The operators' dining-room on the second floor; the complete little kitchen, where warm food is prepared; the pleasant little lounging-room with its cheerful appointments; the perfect toilet arrangements and cloak-room accommodations—all these unusual features are of as much value to them as to their employees. They inspire the working staff with confidence in the fair intentions of the company; make the labors of the day lighter and brighter; and secure for them that higher quality of service which seems to be in all cases the natural outcome of such a policy. Perhaps, during the pressure of eight hours' labor, involving the handling of over 150,000 calls, the temporary relief, during the day, is the influence which makes work pleasant and patience a permanent characteristic.

The Toledo Home Telephone Company represents a capitalization of $2,500,000. Its inception is primarily due to the continued irritation and dissatisfaction experienced by the business men of Toledo, on account of the unsatisfactory telephone service they had received until the year 1901. The Central Construction Co. were the originators of the idea and carried out the entire process of organization, construction and operation. The name of Mr. Edward L. Barbour in connection with this company, as well as James S. Bailey, Jr., indicate the energy, determination and ability which led to the practical development of this great Independent concern in the field of Independent telephony.

W. W. DEAN GAINS LEGAL VICTORY.

SINCE the sale of a majority of the stock in the Kellogg Switchboard and Supply Company to Western Electric and Bell interests, the policy of the company in regard to patents and litigation has undergone a change. As a result of that change it became known that suits would be brought against Independent companies "right and left." The announcement of the sale somewhat spoiled this plan, but it is evident that the suits have only been postponed.

As an evidence that the policy still remains the same, we have the recent suit against the Dean Electric Company, William W. Dean and his associates. In April, counsel for the Kellogg Company went before Judge Thompson, of the United States District Court, in Cincinnati, and succeeded in obtaining a temporary order restraining Mr. Dean from executing assignments to the other defendants named, and them from accepting such assignments. The order was made returnable before Judge Wing, at Cleveland, and continued in force until July 6th, when arguments were heard by Judge Wing on the Kellogg Company's motion for an injunction to continue the restraint during the pendancy of the suit.

Judge R. S. Taylor appeared for the Kellogg Company, and Judge W. W. Boynton and Mr. Edward E. Clement for Mr. Dean.

The most flattering testimonials to the quality of work expected from the Dean Company were given. It was asked not only that Mr. Dean be restrained from working for the Dean Company, but that he be forced to go back to work for the Kellogg Company under an old contract which they set up.

Judge Wing refused the injunction. He reviewed the contract set up (which is similar to many contracts between companies and their employees), and dwelt upon the provision requiring Mr. Dean to submit any inventions he might make to the Kellogg Company, to be accepted or rejected as the company might decide. The judge held that there was a complete absence of mutuality in the contract, there being no means by which the employee could force the company to accept his inventions or continue to employ him, in spite of the fact that the aid of the court was invoked against him. It was also mentioned that no court of equity would enforce specific performance of a contract for personal service.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

McINTIRE SLEEVES v. W. U. JOINTS.—(399.)

Will you please inform me what advantages there are, if any, in the use of McIntyre sleeves instead of Western Union joints. G. A.

The object of McIntire sleeves is to secure a joint which shall realize as nearly as possible the full strength of the wire; which shall be cheaper and easier to make than the so-called Western Union splice, and which can be used upon hard drawn wire without the objectionable features of so sharply twisted wire as is necessary with the Western Union splice. Also to secure as great conductivity as is obtained with the latter joint when it is soldered, without subjecting the wire to the injurious annealing action of a blow lamp.

ROCK ANCHOR.—(400.)

Is there any particular method advocteed for fastening a guy anchor to rock? S. S.

In Fig. 400 is illustrated the method usually employed. A hole is drilled in the rock at about the angle shown and just large

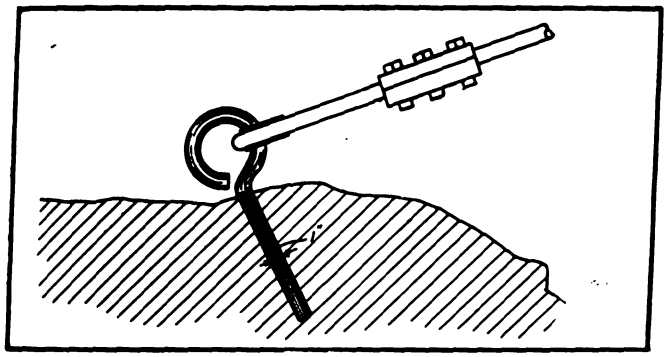

Fig. 400.

enough to allow an eye bolt 1 inch in diameter and about 18 inches long to be driven in and to fit tightly. This is as good a method as we know of.

BI-METALLIC WIRE.—(401.)

Kindly explain what is meant by bi-metallic wire. What is it used for and is it superior to copper? R. B.

Bi-Metallic wire is the trade name for a species of wire which is made by coating a small sized steel wire with a layer of copper. Primarily, the object of this device is to secure a wire which shall have great tensile strength, and at the same time high electrical conductivity. The requisite tensile strength is secured by the steel core, while the electrical conductivity is attained by the copper sheath. Unquestionably this combination affords a higher tensile strength conjoined with better conductivity than can be obtained by either steel or copper alone.

Theoretically, for telephone purposes, if a wire could be made with a copper core and an iron sheath, it ought to give slightly better results in transmission. It is, however, probable, that in ordinary practical work such improvement would not be greatly noticed.

As bi-metallic wire costs more than either iron or copper, it has not come into wide use, excepting in cases where it is necessary to swing long single spans as in the crossing of rivers, etc.

HARD AND SOFT DRAWN COPPER WIRE.—(402.)

What are the electrical and mechanical advantages of soft and hard drawn copper wire, also what precautions, if any, have to be used in construction? U. Tel. Co.

Wire of all descriptions is manufactured by rolling the metal of which the wire is to be composed into rods about ½-inch in diameter. Then the so-called "wire rods" are pulled through a die which consists of a plate of hardened steel having a hole drilled in it, slightly smaller than the rod. When the rod is pulled through the die, the metal is compressed and elongated and at the same time the rod is reduced in diameter. By pulling the wire through one die after another, each having a slightly smaller hole, the wire can be reduced in diameter to almost any desired degree. The operation of this process of drawing is to create on the surface of the wire a kind of a skin which is exceedingly hard and strong. This effect is somewhat similar to that produced by tempering in the case of steel. Hard drawn wire therefore possesses considerably greater tensile strength, usually two or three times that of soft metal, but on the other hand its electrical conductivity is reduced from 3 to 4 per cent. The advantage gained in extra tensile strength is so much greater that it is cheaper to use hard drawn wire of slightly larger size to compensate for the decreased conductivity. As the increased strength is due to hard skin formed on the surface of the wire, great pains should be taken not to injure this surface by nicking or cutting, or sharply bending the wire, and it is equally important to avoid soldering or any other operation which shall heat the wire, and thus destroy the continuity of its surface.

ANTI-SIDE TONE.—(403.)

Will you please explain what is meant by an "anti side tone" circuit? P. L.

It is often desirable to use powerful and sensitive transmitters, particularly over long toll lines. A receiver placed close to such a transmitter (the one in the user's circuit) will usually be afflicted with an abominable "side tone." The method of the accompanying illustration Fig. 403, may be used to mitigate this evil. The induction coil is wound in four parts, *a a'* being the primary and *b b'* the secondary; *a a'* are placed in parallel, and in series with the battery, transmitter, and impedance coil *c*, while a condenser is in bridge. The secondary is in series with

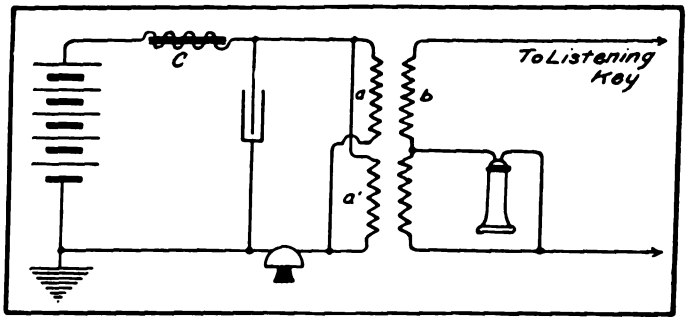

Fig. 403.

the toll line, the receiver being placed in parallel with half of the winding. Evidently the transmitter is in a low resistance local circuit, while the effect of all the windings of both coils of the primary is impressed on the secondary circuit. In the secondary circuit the coils are in series, hence there is the greatest possible step-up effect from the induction coil. The receiver only gets half the voltage of the induction coil, while the toll line receives it all. If the receiver is high wound it will have but a slight shunting effect on the toll line, and as its circuit is but a fraction of the induction coil, secondary, the side tone is much reduced. Obviously the expedient can be extended to reduce side tone to any desired extent.

SOLDERING SOLUTION.—(404.)

Can you give me a formula for or the name of some good soldering solution for soldering galvanized wire joints? E. F. B.

Take a wide necked, 6 oz. bottle, and pour in about 2 or 3 ounces of hydrochloric acid. Drop into the bottle a dozen or two small pieces of zinc, preferably granulated and wait until all ebullition ceases. This solution is about the best for general soldering and you will probably find it satisfactory. There are many kinds of soldering sticks sold by electrical supply companies, which are convenient to use. In using either the solution or stick flux, apply the heat to the middle of the joint, as the solder must run there first to obtain strength and solidity. Too much heat will anneal the wire and weaken the line. Wipe the joint free of all acid after soldering, or corrosion will follow.

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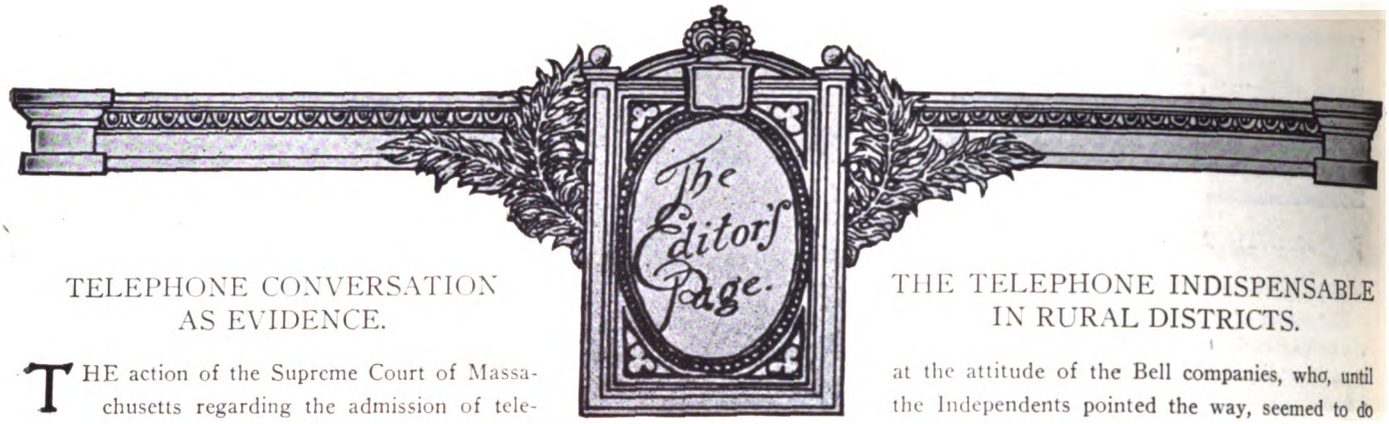

TELEPHONE CONVERSATION AS EVIDENCE.

THE action of the Supreme Court of Massachusetts regarding the admission of telephone conversations as evidence is not only interesting from a legal point of view, but it marks conspicuously the present status of the telephone as a social factor. In the case in court the question was raised of whether a witness could properly testify to what he heard plaintiff say as part of an alleged conversation with the defendant over the telephone, the parties to the conversation being miles apart. The Court held that the evidence was admissible.

It would be difficult to cite a better illustration to show how completely the telephone has become an integral part of the social life of the country. It must be reckoned with, hereafter, not only as a helpful and ingenious device for annihilating time and space, but as a great social force on which the future development of the race largely depends.

The President, who from the retirement of his country home many miles away, may at any moment talk over long distance wires with the heads of departments in Washington, is practically in Washington and at his office every day. He is present and absent at the same time, contrary to all of the deductions of science and to the famous ruling of Speaker Reed. Yet, so closely has the telephone been woven into our social fabric, this astounding fact passes without notice or, at most, more than a passing thought. The merchant who keeps in touch with his trade and his market by means of the telephone; the housewife who has the entire business community at her command, through a hole in the wall, and who can talk with her friends without leaving the room, even if they live in another State, do not stop to reflect that they are utilizing an invention as revolutionary as was the railroad itself. The visitor at the Louisiana Purchase Exposition, who looks with interest at the enormous display of telephone apparatus, and sees without wonder the important part which the telephone plays in this great exposition, rarely stops to reflect that the first telephone exhibit ever made was at the famous Centennial exposition at Philadelphia, less than thirty years ago, and that then the telephone was regarded more as an interesting scientific toy than as a practical device destined to revolutionize the commercial life of the world in less than a quarter of a century.

Decisions like that of the Massachusetts Supreme Court and exhibits like those at St. Louis have an additional and unintentional value, in that they arrest the attention for a moment and confront us with the greatest miracle which has been wrought in modern times. The beginnings of telephony were necessarily slow; that is, slow relatively. In the nature of things this would be true, and it was particularly true in this case because the patents passed into the control of a grasping monopoly which failed to appreciate the tremendous future of the telephone as a commercial proposition. The present rapidity of movement which characterizes the progress of telephony dates from the expiration of these primary patents and the subsequent revolt from Bell rule, which revolt found expression in Independent telephony. Since then, progress has been rapid enough to suit all except the remnants of this once all-powerful monopoly.

It is easy enough now to look back and see that the Bell people might have avoided all competition by pursuing a different policy; just as in the light of ten years' experience we now wonder at the attitude of the Bell companies, who, until the Independents pointed the way, seemed to do all in their power to discourage the use of the telephone in the country. These things have passed. The monopoly took the wrong course to avoid competition, and Independent telephony became a great and growing fact, with no interest in the Bell companies except to avoid their mistakes.

THE TELEPHONE INDISPENSABLE IN RURAL DISTRICTS.

It is pleasing to those who are interested in the development of Independent telephony to note how well have two great mistakes been avoided. As the birth of competition was due to the unsatisfactory service of Bell companies, it was natural that Independents should take from the start as their watchword, "good service." They believed that a proper regard for the rights of the people and the desires of the consumer would pay in the long run. Avoiding the great and vital mistake of giving poor service, so characteristic of monopoly, the Independent companies started on that marvelous career of development, which has astonished themselves and thrown consternation into the ranks of the enemy.

But good service was not enough. Adequate service was necessary. By confining the telephone to the cities, a giant was being imprisoned and a wonderfully fertile field was being left unexploited. Therefore the Independents set about to avoid this second great mistake, and encouraged the building and development of rural lines. So successful has been this movement and so valuable have these country lines proved as "feeders" for the city systems, that even the Bell companies, where compelled to by competition, are extending their system in the country. But the praise for this movement, which is one of the most significant developments of this remarkable age, is due entirely to the Independents.

The extent of the rural lines now in operation has become so great that in the Middle West, where Independent telephony has had its greatest growth, there is hardly a town or village of any importance which is not connected with an Independent line so that intercommunication is possible. Farmers have been quick to see the advantages of the telephone, and the day will soon be here when it will be considered as necessary in the farm house as the plow and cultivator are in the field.

The possibilities in the rural telephone are endless. The latest, and an altogether unexpected, development is the use which is being made of the device by traveling salesmen for the city firms. Where once it was necessary for him to travel many miles to reach the man he was after, only, perhaps, to find that the trip was unnecessary, he now goes to the nearest telephone and has a preliminary talk with his party before making the trip.

These methods have won the day. Good service has become synonymous with Independent telephony, and Independent lines have been welcomed in every observing community, because the establishment of an Independent line has meant telephones in the farm houses and throughout the rural districts. These methods will always win, other things being equal. There is a significance in the fact that in northern Indiana, which State is one of the Independent strongholds, there are 32,575 Independent telephones in use and only 2,157 Bell instruments. This disparity did not come about by accident. It arises from causes that are fundamental.

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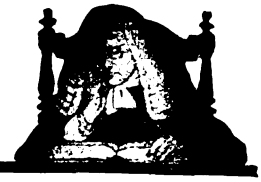
The Telephone in the Courts

Conducted by A. H. McMillan.



Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

TELEPHONE AND RAILROAD COMPANIES.

THE Supreme Court of Louisiana has rendered a decision interpreting the language of the statute giving telephone companies the right to construct their lines "along and parallel to any of the railroads in the city." The Southwestern Telephone Company brought an action to expropriate a right of way for its poles and wires on the east side of the right of way of the Kansas City, Shreveport & Gulf Railway Company, a distance of 248 miles. The plaintiff was given judgment, and the value of the right of way thus expropriated was assessed at $10 a mile. The defendant appealed from the judgment upon three grounds. Defendant contended, first, that the language quoted above did not authorize the construction of telephone lines upon the railroad. The answer to this was that the plaintiff did not propose to establish its poles and wires upon the railroad, but simply upon the right of way. Secondly, defendant contended that plaintiff's poles and wires should be established upon the west instead of the east side of defendant's track, as likely thereby to occasion less inconvenience. The wires of a telegraph company were already strung on the western side of the track, and the matter of convenience or inconvenience seemed to the court to be rather hypothetical than real. Southwestern Telephone Co. vs. Kansas City, S. & G. Ry. Co. (109 La.), 33 S., 910.

INSULATION REQUIRED AT CROSSINGS.

THE fact that there are other lines of wire above those of an electric company increases the latter's obligation of care towards the public. The later comer's fault in not guarding against accident does not excuse the company first there from taking additional precautions. This was the holding of the Supreme Court of Louisiana in Herbert v. Lake Charles Ice. Light & Waterworks Company, Limited. The defendant's wires were in place at a certain point in the city of Lake Charles when the Cumberland Telephone & Telegraph Company built its lines over those of the Lake Charles Company. The latter company alleged that the insulation was worn off its wires by the dragging of the Cumberland Company's wires across its own in the process of construction. A heavy storm came up and broke one of the Cumberland Company's wires, which fell upon one of the uninsulated wires below, causing it to burn through and fall upon the street, where a pedestrian coming in contact with it was killed. The widow of the deceased sued the Lake Charles Company for damages and was given $4,000 in her own right and $4,000 as tutrix of deceased's child.

Defendant claimed that, if there was any legal liability to plaintiff by any one, it was by the Cumberland Company; that the latter company, when it erected its own poles and strung its wires, found defendant in position under legal authority, and upon it was imposed the duty of doing everything that should be necessary for the protection of life and property; that it should have strung its wires below those of defendant, or if it strung them above it should have availed itself of every instrumentality in its power to guard against the injury in this case. The court held that even if the Cumberland Company was under the duty that defendant asserted, the defendant was not hereby relieved from its own duties in the case. It should have taken steps itself to relieve the situation from danger, and not have remained inactive simply because some other company had come to have legal liabilities to the public imposed upon it. If the situation was such as would have enabled the defendant to have forced the Cumberland Company to perform the duty imposed upon it, it should have made use of its power in that direction, or, failing that, it should have applied some proper remedy itself. If the insulation was worn off its wires by the fault of the Cumberland Company, defendant should have at once repaired them, independently of the quarter from which the defect arose. If the telephone company had a duty to perform, the defendant likewise had one to perform, and, both failing, both are liable whether sued separately or together.

The defendant also contended that it should be held free from liability because the injury was the result of a storm and therefore beyond the defendant's control. This contention the court overruled since the defendant was in default as to the condition of its wires at the point where the accident took place, not only as respects extraordinary storms, but as to events likely to happen at any moment from the simplest causes. The court thought that notwithstanding the storm and notwithstanding the falling of the telephone wire, the deceased would not have been killed had defendant's wire been properly insulated.

The court considered the damages awarded as too high and reduced them to $3,000 for plaintiff herself and $3,000 for her child. Thus reduced, the judgment was sustained. Hebert v. Lake Charles Ice, Light & Waterworks Co. (111 La.), 35 S, 731.

SERVICE OF PROCESS.

SERVICE of process upon the keeper of a drug store in which is located a telephone toll station of which he has charge, is sufficient service to sustain a judgment against the telephone company; such is the holding of the Supreme Court of Georgia in a recent case. The Southern Bell Telephone & Telegraph Company had, in the town of Oglethorpe, Ga., a long distance telephone toll station, located in the drug store of Dr. Crumley, whose duty it was to collect tolls from the patrons of the company, and to give such patrons the desired connections with the telephone system which had been established in the city of Americus. The operators in charge of the exchange located in that city connected the telephone at Oglethorpe when called upon to do so by Dr. Crumley with other telephones connected with Americus and in adjacent towns.

One Roy Parker brought suit against the company, alleging that it had placed a telephone in his store for use in his business, on which he paid the usual charges. He alleged that the company neglected to attach a ground wire to the telephone, and to equip it with the necessary appliances to prevent injury from lightning, although Parker had asked to have this done. One day Parker, while standing about four feet from the telephone, was struck by a bolt of electricity, conveyed from the telephone wires to this telephone, by which he was knocked senseless to the floor, and severly injured.

Process was served upon Doctor Crumley. Judgment was afterwards taken by default against the company and the defendant moved for a new trial on the ground that Dr. Crumley had no authority to receive service. It was his duty to take care of the instrument in his store, cleaning the carbons of the lightning arrestors and changing fuses in the office, but doing nothing else; all the rest was done by a lineman from the Americus exchange. The statute of the State declared that service might "be perfected by serving any officer or agent of such corporation." The court held that while Dr. Crumley was not an officer of the company, neither was he its mere servant or employee, as commonly understood. Applying the rule that the "ordinary signification shall be applied to all words except words of art," the court held him to be an agent, and that services upon him was sufficient to justify judgment. Southern Bell Tel. & Teleg. Co. vs. Parker, (Ga.), 47 S. E. 194.

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IN THE OPERATING FIELD.

DISTRICTS OF OHIO INDEPENDENT TELEPHONE ASSOCIATION.

AT the recent meeting of the Ohio Independent Telephone Association, it was decided to divide the State into nine districts, each of which is to be in charge of a vice-president of the association, who is to look after all local matters. The various districts, with the vice-presidents in charge, are as follows:

District No. 1—J. B. Hoge, vice-president, Cleveland; consists of Erie, Lorain, Cuyahoga, Huron, Medina, Lake, Geauga, Ashtabula and Trumbull counties.

District No. 2—W. F. Laubaugh, vice-president, Akron; Summit, Portage, Mahoning, Stark, Columbiana, Carroll, Jefferson, Harrison and Tuscarawas counties.

District No. 3—J. B. Rhodes, vice-president, Zanesville; Coshocton, Muskingum, Guernsey, Belmont, Noble, Monroe, Morgan, Washington, Perry, Athens, Meigs and Gallia.

District No. 4—G. P. Thorpe, vice-president, Wilmington; Pickaway, Fayette, Vinton, Jackson, Scioto, Lawrence, Pike, Adams, Highland, Clinton and Ross.

District No. 5—W. G. Thompson, vice-president, Lebanon; Butler, Warren, Hamilton, Clermont, Brown and Preble.

District No. 6—J. C. Reber, vice-president, Dayton; Greene, Montgomery, Clarke, Champaign, Logan, Shelby, Darke and Miami.

District No. 7—G. E. Matheany, vice-president, Lima; Marion, Wyandot, Hancock, Putnam, Paulding, Van Wert, Mercer, Allen, Auglaize and Hardin.

District No. 8—R. E. Hamblin, vice-president, Toledo; Williams, Fulton, Lucas, Ottawa, Sandusky, Seneca, Wood, Henry and Defiance.

District No. 9—Dwight E. Sapp, vice-president, Mt. Vernon; Crawford, Richland, Ashland, Wayne, Holmes, Morrow, Knox, Union, Delaware, Licking, Franklin, Fairfield and Hocking.

AUGUST 1, 1904.

THE ZENITH COMPANY EXPANDS.

THE Zenith Telephone Company, which operates in Duluth, Minn., is now expending between $75,000 and $100,000 in enlarging and improving its plant and adding to its capacity. When the work is complete the company will be in a position to handle 1,000 more subscribers, making the total capacity of the plant about 3,500. At present about 2,500 names are on the books as subscribers.

A crew of 100 men is employed in making the improvements in various parts of the city, establishing new lines, laying conduits, etc. A new switchboard, with a capacity of 1,000 subscribers, is being installed. A complete party line system is also being put in. In all about $10,000 is being spent in laying underground conduits, and a large number of leads are being placed in different parts of Duluth.

INDEPENDENT COMPANY ISSUES SOUVENIR.

THE Inter-State Independent Telephone company, which operates a system of exchanges in Illinois, has just issued a handsome souvenir accompanying the thirteenth regular quarterly dividend, with illustrations of the interior of exchanges at Aurora, Elgin, Springfield, Plainfield, Joliet, Sterling and the exterior of the Inter-State Building at Peoria. This exchange will be in operation by November 1. Twenty-one miles of the streets are covered by the conduit system.

The souvenir contains much useful information. At the top of the principal page is a map showing the toll lines of the Inter-State Company. In the Aurora exchange the switchboard has a capacity for 4,000 lines, and a conduit capacity of 5,500. Put in operation January 1, 1901, with 300 subscribers, the present subscribers number 1,693. The Elgin exchange has 735 subscribers at the present time. Joliet has 1,800; Springfield, which was put in operation November 1, with 1,000, has 1,745 subscribers at the present time. Plainfield has 545 and Sterling has 591. Sterling's exchange was put in operation on July 1.

SOME FIGURES FROM OHIO.

AS an indication of the strength of the Independent situation in Ohio the following figures will prove of interest: Independent companies in Ohio have over 183,000 telephones, as shown by the tax returns against the Bell company's 90,000, including Cincinnati and Cleveland. The Independents have over twice the mileage of toll line in Ohio the Bell has. They also have a very large rural development which the Bell has not. The Independents have accomplished this growth within a period of seven years.

Columbus, in two years, has reached 5,200 subscribers, and the managers of that exchange are now completing arrangements for a new automatic exchange which will accommodate 19,000 telephones, 10,000 of these to be installed immediately.

Toledo, in two years, has 7,000 telephones, while the Bell has less than 4,000.

In Champaign County the Independents have over 1,400 telephones, while the Bell has less than 100.

Darke County has over 1,100 Independent telephones, and less than 50 Bell.

Shelby County has over 1,000 Independent, and less than 200 Bell.

Logan County has over 1,200 Independent, while the Bell has nothing but toll stations. Many other counties could be named which show the same ratio of the Independent to the Bell. These are only a few instances which show only too plainly the immense headway that is being made by the Independent telephone companies.

AS IT IS ON THE OTHER SIDE.

ONE of the officials of the National Telephone Company, of London, has recently been telling his troubles to an unsympathetic world. His plaint reaches nearer home the hearts of telephone men, who know what it is to bear burdens of the same sort in America. In England, it appears that right-of way—or, as they call it over there, "way-leave"—furnishes the greatest amount of trouble. The average Britisher is very intent upon maintaining what he considers his rights, and the extent of his ardor in this direction sometimes leads to peculiar complications. A land owner, outside of London, suggested, once, that in exchange for the privilege of putting up poles, the National Telephone Company should build him a house. In another case the owner asked £300 a year for permitting the erection of a standard on his roof.

"Matters of this sort," the National man is quoted as saying, "may be obviated by a little judicious jollying, or even by changing the rout of the line, but the bull-dog prejudice that we run against occasionally is hard to get around. Recently a well-known and influential London attorney stated that whenever possible he would prevent the telephone service from spreading. As he is

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the owner of a large block of realty in a section of the city, he has succeeded in keeping us practically out of that neighborhood."

"Some of the objections made to us," continued the telephone official, "are almost incredible and one hesitates to repeat them, for fear of misbelief on the part of hearers. Two women at one time ordered the removal of wires passing over their garden, alleging that their nephew, who they suspected had designs on their property, had sent ghost messages over the wires and that the messages reverberated through the house. At another time the owners of a poultry farm declared that after the wires were laid across the top of the house the hens laid fewer eggs. An angry owner once tied a group of our wires to a dog kennel containing a ferocious hound and then invited our men to remove the leads.

"Telephone men, of course, are frequently threatened with shotguns. Sometimes they take risks and sometimes they don't; it depends a good deal upon the nerve of the telephone man, but also upon what he thinks the property owner will do. If the latter has the reputation of being a pugnacious fellow, ready to assert his claims on all occasions, the wireman usually takes the better part of valor and leaves the property. On one occasion a way-leave official got out of a fix in a decidedly original manner. The owner had threatened to kick him out of the place. The telephone man inquired whether he might have the way-leave after he had received the kicking. The owner assented, but on the way-leave man's preparing for the kicking the property holder's sense of humor was touched and he granted the right-of-way without further demur.

ETIQUETTE OF THE TELEPHONE.

DOUBTLESS there is not a business man in the city who has not had occasion many times to call the attention of some of his clerks to the fact that each person who rings up on the office telephone is not a personal enemy. The ordinary office clerk who responds to a telephone call takes on a tone of voice as though he were answering under protest. He is surly, sharp and disagreeable—at least that's the way it sounds. It is to overcome this difficulty that a little card, attractively printed and without an advertisement on it, is now being hung close by the telephone in many offices. It tells how a telephone call should be responded to. We are indebted to Frank A. Burrelle, of Bureau Clipping fame, for this original and instructive monograph, whose influence we believe is certain to be far-reaching.

When Using This Telephone

REMEMBER that a stranger is at the other end of the line.

REMEMBER that the tone of your voice may make him a customer or drive him away.

MAKE a customer of him and you increase your usefulness to this office.

THEREFORE, when using this telephone always be polite, agreeable, accommodating and patient.

ACT, when you answer a call, as though it were the only bit of work you are called upon to do all day, and do it in an absolutely perfect manner.

AN INDEPENDENT COMPANY FOR OMAHA.

APPLICATION for a twenty-five year telephone fanchise has been made to the city council by the law firm of Blackburn & Spurlock, representing the Interstate Telephone Company of Dubuque, Ia. No ordinance was presented, but in a general way the proposition to be made was set forth in the communication, which was referred to the committee of the whole.

The seekers of the franchise guarantee a system with not less than 2,500 subscribers, promise a $3 monthly rate for business telephones and $1.75 for residences on individual lines, equipped with copper metallic circuits, and offer the city a royalty annually of 3 per cent. upon the gross receipts.

According to the attorneys the Iowa and Minnesota capitalists, headed by Victor Stevens, of Dubuque, who desire the Omaha franchise, are builders and not merely promoters, and have constructed numerous successful lines in Iowa, Illinois and Minnesota, all of which are satisfactory and which they still own. Work will be started within three months if an Omaha franchise is secured. The company is willing to go under bond and not to sell out to any other local concern and to protect the city in various ways, and also to deposit cash to compensate the city for the restoration of paving or other damage.

Wires in a district bounded by Twenty-eight, Clark and Leavenworth streets are to be underground, pole connections to be allowed inside individual blocks, however. Notice is given that the formal application for a franchise to use the streets and alleys will be presented and a willingness is expressed to abide by all the regulations the city may choose to make.

Mr. Blackburn states that the lines of the company extend across Iowa almost to Council Bluffs and that a franchise will be asked for in that city, and through connections made, provided the Omaha franchise is obtained.

INDEPENDENT MUNICIPAL TELEPONES

THE Board of Awards of the City of Baltimore, Md., has recently given the contract to the Maryland Telephone and Telegraph Company for the municipal telephone exchange from August 1, 1904, to July 31, 1907.

Bids were received from both the Maryland and the Chesapeake and Potomac Telephone companies. The latter company submitted four propositions, two based upon furnishing its own private exchange and the other two upon utilizing the present Maryland Exchange in the City Hall, but substituting its own paraphernalia. On the direct comparison between each company's bid to furnish its own exchange, with 15 trunk lines and 117 stations, at $8 each, the figures were:

Maryland:
Trunk lines and 25,000 calls a year.....$1,225
Chesapeake:
Trunk lines and 25,000 calls.....$1,410

Both bids were made with the underetanding that the city furnish operators, and annexing this cost of $2,250 per annum to each bid, together with $936 for 117 stations at $8 each, the total cost of each exchange would net: Maryland, $4,406; Chesapeake, $4,596, a difference of $190 in favor of the Maryland, this difference being due to the latter company charging 2 cents a call, while the Chesapeake asked 3 cents. This charge is for calls made to points outside of the municipal exchange, all calls between city departments to be free.

HUNTINGTON INTERESTS IN THE SOUTHWEST.

THE Huntington syndicate of California is rapidly carrying out its plans to establish a thorough long-distance telephone line between the Atlantic and Pacific coasts. This syndicate acquired important Independent long-distance lines in Texas several months ago, and is operating them in connection with local Independent exchanges. These Independent lines extend into Louisiana, and it is planned to extend them east to New Orleans and points on the Atlantic seaboard. The syndicate has recently acquired long-distance lines in New Mexico and Arizona, and these will be operated in connection with its existing lines in California. A gap of 600 miles between El Paso and San Antonio will have to be built, and this work will be started on in the near future.

CENTRAL ILL. ASSOCIATION ORGANIZED.

PRELIMINARY plans to organize the Central Illinois Independent Telephone Association, to include every central Illinois Independent telephone company, were made in Bloomington, Ill., recently. Albert Schuler, of Streator, was chairman of the meeting, and R. C. Critchfield, of Minier secretary. A committee was appointed to outline permanent organization plans.

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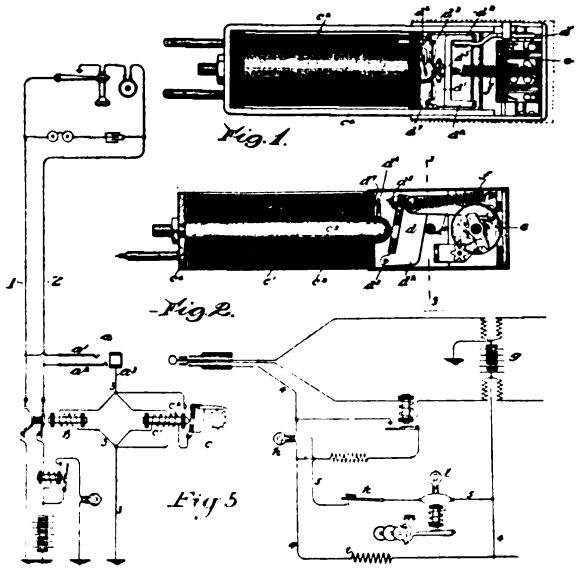
TELEPHONE PATENTS

CALL METER.

C. E. Scribner, of Chicago, Ill., and F. R. McBerty, of Evanston, Ill., patent (No. 765,255) and assign to the Western Electric Company, of Chicago, Ill., a call meter for telephone exchanges. The object of this invention is to produce an improved register



for indicating the number of calls which each substation makes. A detail of the apparatus is shown in Figs. 1 and 2. From which it will be seen to consist of an electromagnet having two windings, c^1 and c^2. The electromagnet actuates an armature, d^2, which is attached to an accounting mechanism similar to that of an ordinary cyclometer. The circuit is shown in Fig. 5, from which it will be seen that one winding of the meter c^1 is placed in parallel with the cut-off relay b, while the second winding c^2 forms a shunt around the first winding. After the operator has inserted the plug and obtained the desired party she presses the key k. This operates the register, and, at the same time, causes the signal lamp t to glow, or the counter m to register. This latter device is so arranged as to notify the chief operator that the proper registration has been made.

COMBINED SPRING JACK.

J. L. Kise, of Wellington, Kans., patents (No. 765,183) an improved spring jack. This spring jack is designed chiefly for telegraphic work, though it may be used in telephony. It consists of a base plate carrying two springs, one placed in the groove in which the plug is inserted. The other spring is placed upon the space outside of the first spring and when the plug is inserted the first spring is brought into contact with the second.

SELECTIVE SIGNALLING APPARATUS.

J. J. Comer, of Parkridge, Ill., patents (No. 765,413) an improved device for party line selective signalling. The gist of Mr. Comer's invention consists in providing each substation with a kind of an electric motor whose armature can be rotated either right-handedly or left-handedly, depending upon whether the operator sends positive or negative current over the line. By means of the rotation of the armature in either direction at pleasure a contact mechanism is operated whereby any station may be selected.

MESSAGE COUNTER.

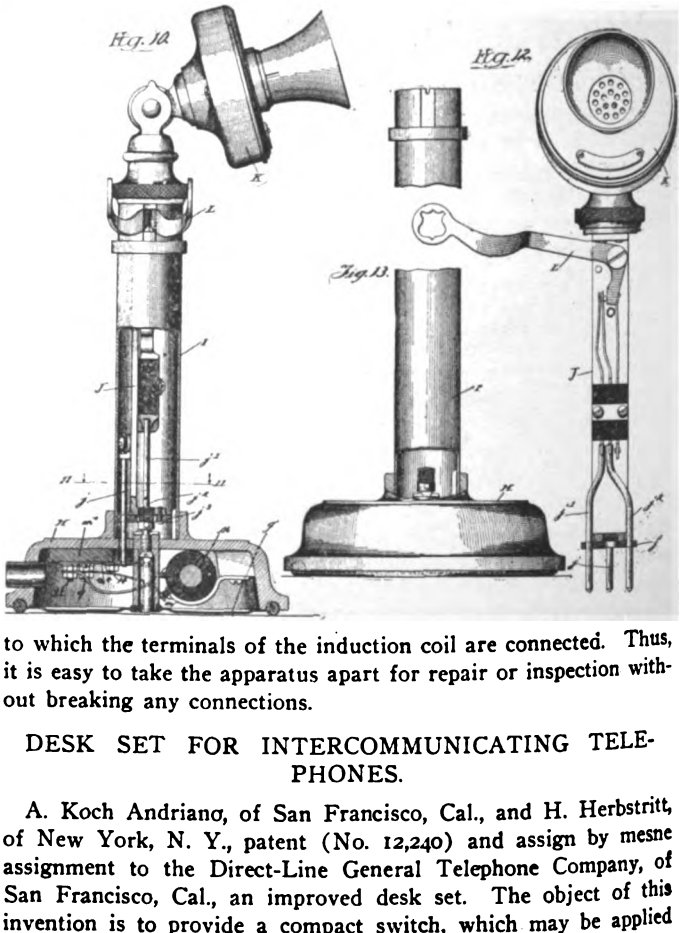
H. D. Stroud, of Chicago, Ill., patents (No. 764,963) and assigns to the National Measured Service Company, of Chicago, Ill. The object of this invention is to provide a message counter which shall be placed in the subscriber's substation, and which is actuated by the subscriber whenever a call is made and, yet, at the same time, the operator is enabled to cancel the registration in case the desired party cannot be obtained. The inventor provides a device similar to a cyclometer, so attached to the hook-switch that the use of the telephone shall cause the number dials to rotate. He further provides an electromagnet, which is under the control of the operator, and so arranged that if the party cannot be obtained the operator can cancel the registration which the subscriber has previously made.

ELECTRICAL MEASURING INSTRUMENT.

A. A. Kent, of Philadelphia, Pa., patents (No. 764,814). The object of this invention is to provide an improved instrument which can be used either as a voltmeter or an ammeter. The device contains a pivoted indicating needle attached to a magnet placed in a magnetic field, which is created by the current it is proposed to measure. This magnetic field is produced by a magnet which has two windings, one of coarse and one of fine wire. The circuit of these windings is controlled by a spring, and thus by cutting in the fine wire the instrument may be used as a voltmeter, and if the coarse wire is employed it becomes an ammeter.

TELEPHONE DESK SET.

P. C. Burns, of Chicago, Ill., patents (No. 765,064) and assigns to the American Electric Telephone Company, of Chicago, a telephone desk set. This invention relates to an improved desk set, which is illustrated in Figs. 10, 12 and 13, from which it will be seen that the induction coil is placed in the base of the set, the switchhook and contact springs being carried in the post. From the contact springs connections are made through the pins j, j', j^2 and j^3, which are arranged to impinge upon springs (see Fig. 12),



to which the terminals of the induction coil are connected. Thus, it is easy to take the apparatus apart for repair or inspection without breaking any connections.

DESK SET FOR INTERCOMMUNICATING TELEPHONES.

A. Koch Andriano, of San Francisco, Cal., and H. Herbstritt, of New York, N. Y., patent (No. 12,240) and assign by mesne assignment to the Direct-Line General Telephone Company, of San Francisco, Cal., an improved desk set. The object of this invention is to provide a compact switch, which may be applied to desk sets used for intercommunicating telephones. The in-

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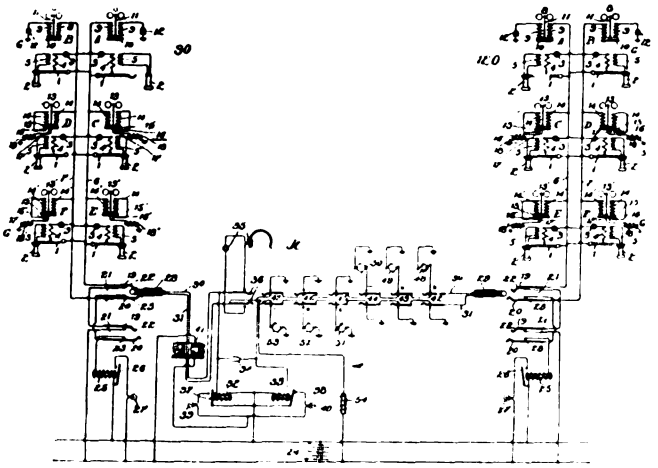
ventor provides a series of contacts placed in the pedestal of the telephone and so designs the pillar which supports the transmitter that it may be rotated and by this means carry a contact spring over the various contacts provided. Locking mechanism is arranged somewhat after the plan of several other well-known intercommunicating systems.

SELECTIVE SIGNALLING SYSTEM.

W. M. Davis, of Chicago, Ill., patents (No. 765,461) and assigns to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y. The object of this invention is to provide a system for the selective signalling of party lines. In



essence this invention consists in so arranging the various substation instruments that one may be responsive to alternating current, another to direct current positive, and another to direct current negative, etc., as shown in the illustration. Each operator is provided with a set of ringing keys containing as many keys as there are different kinds of current. Consequently, the manipulation of any one key will select a particular station.

TRANSMITTER.

W. Kaisling, of Chicago, Ill., patents (No. 765,488) and assigns to the Stromberg-Carlson Telephone Mfg. Company, of Rochester, N. Y., an improved telephone transmitter. The object of this invention is to provide an improved telephone transmitter which the inventor accomplishes, as is shown in the illustrations, Figs. 2 and 4. The peculiarity of this transmitter lies in the fact that the electrodes are composed of four metallic studs, *39*, which

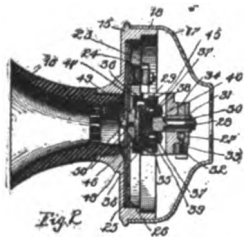


Fig. 2.

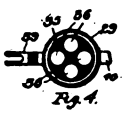


Fig. 4.

are placed inside of corresponding holes shown in the carbon disc in Fig. 4. One pair of these metal studs is connected to one pole of the battery and the other pair to the other pole. In front of these metallic studs the front electrode is placed and connected to the diaphragm, as shown in Fig. 2. There is, therefore, a path for the current from one pair of studs through the granular carbon and then to the other pair of studs. The vibrations of the diaphragm cause variations in the pressure of the granular carbon, which result in the transmission of speech.

CORDLESS SWITCHBOARD.

I. Kitsee, of Philadelphia, Pa., patents (No. 765,142). This patent is a divided application of a patent already granted to the same inventor for the same purpose and previously noticed in our columns. It relates to a device to take the place of the ordinary cords upon the telephone switchboard. The details embraced in the present patent are modifications of a previous patent granted to the same inventor. The device is so complicated as to require a longer description than space will permit and the reader is referred to the description of the patent printed in a previous issue.

PLUG SWITCH.

W. Kaisling, of Chicago, Ill., patents (No. 765,489) a plug switch and assigns to the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y. The object of this invention is to provide an improved telephonic switch, as shown in the accompanying illustration. The inventor provides sets of

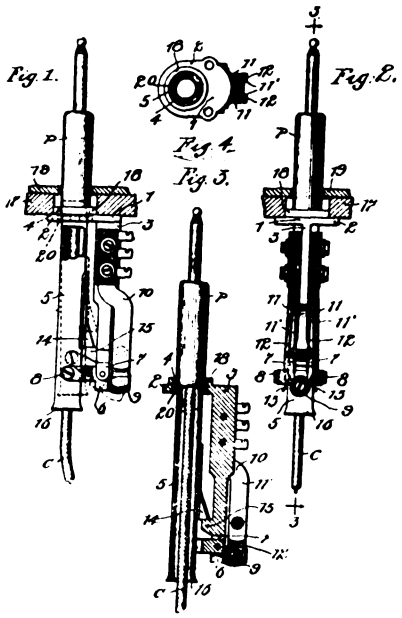


Fig. 1. Fig. 4. Fig. 3. Fig. 2.

springs, *10* and *11*, to which the circuit wires are attached. These springs are operated by an insulating roller, *9*, which is secured to a fork lever, *6*, which is attached to a movable tube, *5*, which rises and falls with the position of the plug. The whole contrivance is attached to the under side of the cord shelf by means of the plate *2*.

TELEPHONE TRANSMITTER.

R. Hansen, of Chicago, Ill., patents (No. 765,480) and assigns by mesne assignment to Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., a telephone transmitter. The object of this invention is to provide an improved battery transmitter. The inventor uses a diaphragm, *e*, to which the electrode *m* is attached by means of a screw, *n*, and nut *n2*. To

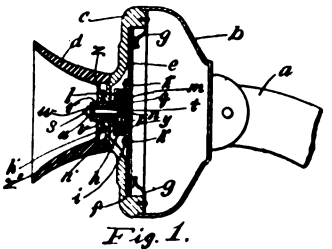


Fig. 1.

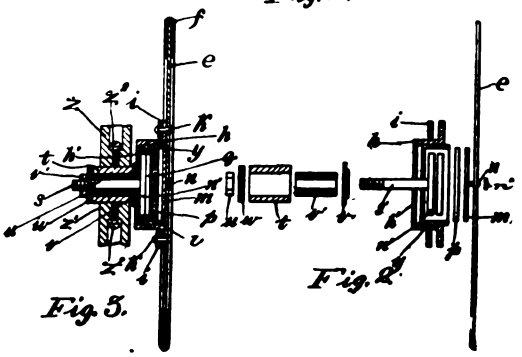


Fig. 3. Fig. 2.

this electrode a carbon disc, *p*, is soldered. There is a capsule, *h*, which is riveted to the diaphragm, as shown in Fig. 3. This capsule carries an interior cup, *y*, which contains the rear electrode *s'*, to which the carbon base plate *n* is soldered. Granular carbon is placed between the electrodes.

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THE WEEK'S MESSAGES

FINANCIAL.

CHICAGO, ILL.—United States Telephone, the long distance Independent company, reports for the five months ended May 31: Gross earnings, $169,487; operating expenses and taxes, $99,865; net earnings, $69,622; charges, $41,671; surplus, $27,951.

AUGUSTA, ME.—The China Telephone Company, organized at South China, has filed a certificate at the office of the Secretary of State. The purposes of the corporation are to establish, construct, equip, maintain and operate telephone lines. The capital stock is $10,000, of which nothing is paid in. The par value of a share is $10. W. J. Thompson, of South China, is president, and Fred B. Foye, of China, is treasurer.

BALTIMORE, MD.—It is understood that the refinancing of the Maryland Telephone and Telegraph Company will not take place until after Mr. George R. Webb returns from a trip abroad. The present capitalization of the Maryland Telephone and Telegraph Company consists of $1,000,000 5 per cent. first mortgage bonds, $1,155,000 outstanding of an authorized issue of $4,000,000 of second mortgage 5 per cent. bonds, and $1,000,000 of common stock.

PALO, MICH.—The Palo Telephone Company has increased its capital stock from $6,000 to $10,000.

HUTCHINSON, MINN.—The Hutchinson Telephone Exchange Company filed an amendment increasing its capital stock from $25,000 to $50,000.

BUFFALO, N. Y.—A mortgage for $500,000 given by the Union Telephone Company of Buffalo to the Knickerbocker Trust Company of New York City, has been filed with the county clerk. The mortgage covers all the property of the company.

GUTHRIE, OKLA.—The assessed value of telephone properties in Oklahoma, as shown in the auditor's office, $166,662, a gain of $42,390 over 1903. The increase last year was $35,066.

DAYTON, O.—The stockholders of the Home Telephone Company, of Dayton, have been notified of a special meeting to be held August 12th for the purpose of voting on an increase of $200,000 in the capital stock of the company. The new issue will be preferred stock.

CANADIAN, TEX.—The Stockmen's Telephone Company, of Canadian, has increased its capital stock from $2,500 to $5,000.

FRANCHISES.

JACKSONVILLE, ILL.—The Illinois Telephone Company, of Jacksonville, has increased its capital stock from $100,000 to $500,000.

ELKTON, MD.—The Cecil Farmers' Telephone Company, at a recent meeting of the county commissioners, held in Elkton, was granted a franchise to construct lines on the public roads in Cecil County. The company has a capital stock of $2,500 and was incorporated recently.

CANASTOTA, N. Y.—A meeting of the directors of the Farmers' Telephone Company was held recently, at which it was decided to increase the capital stock from $1,000 to $10,000.

HOLLY, N. Y.—The board of trustees at a meeting held recently, granted a franchise to the Interocean Telephone Company through its representative, Mr. Daggett. The company has about 200 contracts for telephones in this territory, which it proposes to center in Holley.

STAUNTON, VA.—The Lexington city council has granted a 30-year franchise to the Mutual Telephone Exchange, which includes Clifton Forge, Staunton, Waynesboro, BuenaVista, and other towns.

ELECTIONS.

BALTIMORE, MD.—Important changes were made in the active management of the Maryland Telephone and Telegraph Company. Mr. George R. Webb resigned as president and member of the board of directors, and Mr. David E. Evans, formerly vice-president, was elected to succeed him. Messrs. Webb and Evans were mainly instrumental in organizing the company a few years ago, and since have been developing its lines with excellent results.

JACKSON, MICH.—The Citizens' Telephone Company, at its annual meeting, elected the following directors: J. C. Richardson, president; E. W. Barber, vice-president; E. B. Fisher, secretary and treasurer; Z. C. Eldred, T. E. Barkworth, George W. Carter, W. H. Maloney, J. B. Ware, W. J. Stewart, R. D. Graham, C. E. Tarte and T. Bromley, Jr., directors.

JORDANVILLE, N. Y.—H. W. Wainman has been elected president of the Home Telephone Company.

WAKONDA, S. D.—The Wakonda Telephone Company has elected M. J. Chaney, president; F. A. Swezey, vice-president; Samuel Jacobson, secretary, and L. C. Northrup, treasurer. Plans are being made for further extension on the lines.

COMBINATIONS.

OSAGE, IA.—The Eureka Telephone Company, of Osage, has purchased the Staceyville Telephone Company for $14,500. G. G. Gardner, of the Staceyville Company will manage both companies.

JACKSON, MICH.—Nelman Wing, manager of the Wing system of Independent telephones, yesterday made connection with the Washtenaw Home Telephone Company. This gave a complete Independent system between Jackson and Ann Arbor.

SILVER CITY, N. M.—Oliver Williams is authority for the statement that a California corporation has had one of its managers in this city for several days looking over the Grant County Telephone System with the idea of purchasing.

PERSONAL.

SIOUX CITY, IA.—Frank Bills, of the Sioux City Telephone Company, has returned from Chicago, where he went on business connected with Sioux City's new Independent telephone system, now in progress of construction.

YOUNGSTOWN, O.—W. F. Crossley, manager of the Youngstown Telephone Company, has resigned to become State superintendent of the Colorado Telephone Company, with headquarters in Denver.

BOWLING GREEN, KY.—Joe W. Gilbert has been made business manager of the Home Telephone Company, and will enter upon the discharge of his duties on the 1st of August.

BELLINGHAM, WASH.—H. W. Kent, superintendent of the British Columbia Telephone Company system, is in the city to-day with a party of engineers who are to make the final survey for the telephone cable line which is to connect this city with Victoria, B. C.

MISCELLANEOUS.

EGG HARBOR, N. J.—The Egg Harbor City Telephone Company has commenced business with 65 subscribers and will soon have double that number.

WADENA, MINN.—The Hewitt & Wrightstown Telephone line is completed to Long Prairie. A public pay station has been established at Hotel Reichert.

WILLMAR, MINN.—The Brooten & Sunberg telephone line is now completed and ready for use, and has been so since July 1. The officers of the company are: Ole Kittelson, president; Ole O. Wig, vice-president; Ludvig Iverson, secretary; Nels Nelson, treasurer. The line is a complete metallic circuit, will be operated on a strictly co-operative basis, is 28 miles long—taking in 60 subscribers, so will be a great convenience to the people. The line will connect with long distance at Brooten and Kerkhoven.

SILVER CITY, N. M.—The new directory just issued by the Grant County Telephone Company, is the largest and most complete ever presented to its patrons, for the service now covers a wider field.

PAPILLION, NEB.—The central office of the Independent Home Telephone Company has been moved to larger quarters.

NASHVILLE, TENN.—The local telephone company at St. Johns, Mich., which handles an extensive rural service, is seeking to make its service indispensable by furnishing subscribers with the Government daily weather reports and other important news of the day.

NEW COMPANY NOTES.

PETALUMA, CAL.—The Vallejo Township Telephone Company, with headquarters in Petaluma, has been incorporated with a capital stock of $5,000, by John Caltoft, William Everet, G. W. Ormsbym, Henry Graeff and J. R. Denman.

GRANDVILLE, IA.—The Grandville & Remsen Telephone Company has been incorporated with a capital stock of $2,000. The officers are: J. F. Kriege, president; P. H. Krohnke, secretary, and P. N. Hansen, treasurer. The other members of the board of directors are Mat. Hansen, John Towsfeldt, John R. Dornbusch and Henry Sauer.

BELVIDERE, ILL.—The Boone County Rural Telephone Company, of Belvidere, has been incorporated with a capital stock of $2,500, by Fred W. Plane, D. W. Barnigham and H. S. Hicks.

HARTLEY, IA.—The Grant & Omega Rural Telephone Company has been incorporated with a capital stock of $4,000. The principal place of business will be at Schoolhouse, in district No. 2, on section 3, in Grant township, O'Brien county, with post office address at Hartley. The board of directors are: W. S. Voss, Pendleton Powers, Rudolph Lemke, Louis Putnam, James Farquhar. The officers are: C. A. Magee, president; William Welch, vice-president; J. T. Shinkle, treasurer, and R. H. Wohler, secretary.

SCRANTON, IA.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $10,000.

STOCKPORT, IA.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $10,000.

UTICA, ILL.—At a recent meeting of the Farmers of Banner Township, held in Utica, the Banner Telephone Company was organized with the following officers: John Rosscamp, president; Milliard Rommine, vice-president; G. S. Betts, secretary; Jesse Rommine, treasurer.

CHINA, ME.—The China Telephone Company has ben incorporated with a capital stock of $10,000. The officers are: W. J. Thompson, of South China, and Fred B. Foye, of China.

PRESQUE ISLE, ME.—The Farmers' Telephone Company has been organized by citizens in this vicinity, and headed by Frank Hackett.

MORTON, MINN.—The Morton Rural Telephone Company has been incorporated with a capital stock of $25,000.

ROLLA, MO.—The Rolla Telephone Company has been incorporated with a capital stock of $20,000 by Noel A. Kinney, Robert A. Love, C. E. French, A. L. McRae, James B. Harrison.

FREDERICK, OKLA.—The Frederick Telephone Company has been incorporated with a capital stock of $3,500, by A. X. Campbell, J. M. Bellamy and M. F. Merrill, of Asher.

GIRARD, O.—The Girard Telephone Company has been incorporated with a capital stock of $35,000, by E. L. Hauser, G. J. Jones, W. J. Wallace, J. C. Krehl, S. C. Thayer, E. H. Luize and R. T. Izant.

EDINBORO, PA.—The Edinboro Telephone Company has been organized and application will be made on August 12th for a charter. The application will be signed by J. F. Bigler, C. S. Darrow, Fred Le Suer, E. P. Perry, I. R. Reader, W. A. Proud, G. W. Minium and others.

ERIE, PA.—Application will be made for a charter on August 23d for the Union Telephone Company of Erie, by W. T. Trask, W. H. Wilson, James Russell, W. D. Barnard and Ellis L. Orbis.

PITTSBURG, PA.—Application will be made on August 22nd for a charter for the Pittsburg-Butler Telephone Company, by J. G. Splane, presi-

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dent, Pittsburg & Allegheny Telephone Company· John S. Weller, and T. J. Schuffin. Pittsburg & Allegheny Telephone Company contemplates securing connections with Independent telephone systems within a radius of 100 miles of Pittsburg.

SHERMAN, PA.—The Sherman-Hale Telephone Line has been incorporated with a capital stock of $700, to connect Sherman, Pa., and Hale's Eddy and Deposit, N. Y. The incorporators are: Charles H. Stiles, of Deposit, N. N. Gardiner, Fred Kingsbury, John Thomas, of Hale's Eddy, B. W. Raymond, Geo. B. Arneke, and William Rackwell of Pa.

AMBERG, WIS.—The Amberg Home Telephone & Telegraph Company has been incorporated with a capital stock of $3,000.

UNION GROVE, WIS.—The Union Grove & Paris Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are: Henry Barnes, O. P. Gorham, C. E. Parthoff.

CANONSBURG, PA.—The Farmers' Mutual Telephone Company, of Washington County, has been incorporated with a capital stock of $30,000, by S. N. Hopper, J. R. McPherson, B. K. McConnell, C. M. Linn, H. H. Bebout, R. G. Lutton, R. L. Munce, John Fulton, of Canonsburg; R. B. Blaney, S. Otto Black, J. C. C. Peas, W. H. Martin, of Washington, and H. H. Mollenaur, of Eighty-Four.

WASHINGTON, PA.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $3,000, by the following directors: S. H. Hopper, J. R. McPherson, E. G. McConnell, C. M. Linn, H. H. Bebout, R. G. Lutton and others.

MANSFIELD, S. D.—A meeting of farmers and business men to organize a telephone line from Mansfield to Scatterwood and points west has been held. The charter will provide for a capital stock of $25,000, to be issued in shares of $50 each. The directors of the concern are Geo. Woodford, John Harrington and C. S. Granger.

NASHVILLE, TENN.—The Consolidated Telephone and Telegraph Company has been organized at Huntingdon, Carroll County, with a capital stock of $50,000. The company will build and operate lines in Perry, Wayne, Hardin and adjoining counties in Tennessee.

CHEAPSIDE, TEX.—The Cuero & Cheapside Telephone Company, with principal office at Cheapside, capital stock $5,000, has been chartered. Purpose, to build telephone lines. Incorporators: J. E. Lord, J. F. Elder and C. F. Carson.

ALEXANDRIA, VA.—The Central Mutual Telephone Company, of Alexandria, has been incorporated with a capital stock of from $500 to $5,000. William M. Wheeler is president, B. F. A. Myers, secretary, and A. Conner, treasurer, of the company.

DAMASCUS, VA.—The Damascus Telephone Association has been incorporated with a capital stock of $2,000.

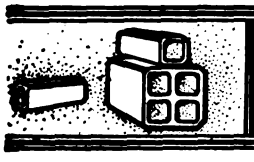
FREDERICKSBURG, VA.—The Toluca & Fredericksburg Telephone Company has been organized with the following officers: Hugh Aida, president; C. A. Bryan, secretary; The Conway, Gordon & Garnett National Bank, of this city, treasurer. The line will run from Toluca to Fredricksburg, via Garrisonville, Stafford Court House, Brooke Station and Boscobel.

CAMBRIA, WIS.—The Cambria Co-Operative Telephone Company has been incorporated with a capital stock of $1,000.

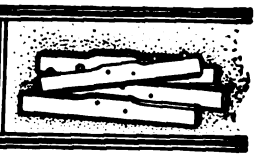
UNDERGROUND.

QUINCY, ILL.—The Central Union Telephone Company is preparing for the installation of its wires in Quincy in underground conduits.

OSWEGO, N. Y.—The Empire State Telephone Company has solicitors to secure permission to put its wires underground.



New Construction in the Field



HUNTSVILLE, ALA.—The planters in the Green Grove district have organized a company with $2,000 capital to furnish themselves telephone connections with this city. There are about 20 subscribers.

SAN DIEGO, CAL.—Coincident with the completion of the concrete foundation for the Home Telephone Company's new building on Sixth street, the plans for the structure proper were received from the Automatic Telephone Company of Chicago, to whom they were referred for approval. The drawings show an extremely handsome front, the materials of which will be brown stone to the second floor, above which pressed brick and terra cotta will be used.

SAN DIEGO, CAL.—The Home Telephone and Telegraph Company is doing some remarkably fast work in installing its plant in this city.

LAKEVILLE, CONN.—A new telephone line will soon connect with the Sharon line at H. B. Conklin's. This new line is known as the State Line Telephone Company. The Dutchess County connections will comprise all the towns in the county.

SIOUX CITY, IA.—The bids on the new telephone exchange to be erected on Jones street by the Sioux City Telephone Company will be opened Wednesday.

SPENCER, IA.—A new rural telephone line is in process of construction in the eastern part of the county.

HOPEDALE, ILL.—The Farmers' Full Metallic Telephone System of Hopedale has its line within a few miles of Mackinaw and will enter that village in a short time. The company has asked franchises in a number of towns which will all be entered in a short time.

HILLSBORO, ILL.—The Big Four Railroad is making arrangements to install a number of telephones along their road between this city and Mattoon.

ROCKFORD, ILL.—At a meeting of the board of directors of the Rockford Home Telephone Company, it was decided to double the capacity of the local telephone exchange and to pay up the 6 per cent. bonds new outstanding against the company. The reissuance of 5 per cent. bonds was voted as a substitute. The present equipment of the exchange is 2,000 lines. This capacity will be increased to 4,000 at an expense of between $50,000 to $100,000, which will affect all of the outside and inside apparatus.

STERLING, ILL.—The Interstate Telephone Company is making arrangements to rebuild its plant in this city. All lines will be made copper metallic.

FREDERICKSBURG, IND.—W. R. Trotter is superintending the work of constructing a telephone line in this vicinity.

NICHOLASVILLE, KY.—The Flemingsburg Telephone Company has begun work on a long distance line between Flemingsburg and Carlisle. The line will pass through Elizaville, Ewing, Cowan, Pleasant Valley, and when completed will afford a through and more direct connection with all points throughout Central Kentucky.

OWENSBORO, KY.—The Home Telephone Company is arranging to construct 12,000 feet of cable through the western part of the city. It will install a four party selective ringing system and make other improvements. The company now has 1,364 subscribers.

COUNCIL GROVE, KANS.—The Council Grove Telephone Company, recently incorporated, is putting in an exchange here and will cover the surrounding country with rural lines.

EXCELSIOR, MINN.—The Twin City Telephone Company of Minnesota, has its line completed to Excelsior and will for the present install a pay station. The company has promised that it will install an exchange in this village next year, when it will make an active canvass for its subscribers.

FAIRMONT, MINN.—The telephones for a new line, the Rutland Central, are to be run from Chas. Sloneker's place to Northrop. There are twenty subscribers and a first-class line is being put up. It will probably connect with the Granada central when it is completed.

ALTON, MO.—The Kinloch Telephone Company has started construction work on its toll line to Springfield.

ALBION, NEB.—W. W. Baker was up from Boone recently in the interest of the Independent telephone that is headed toward Albion from both north and south.

MONCTON, N. B.—The contracts for the new telephone building at Moncton have been awarded. The new building will be two story, brick, with wood basement.

BLUE SPRINGS, NEB.—Plans and specifications for the new office building for the Independent Telephone Company have been made and work upon it will be commenced soon.

HASTINGS, NEB.—The Hastings Independent Telephone Company has filed its acceptance of the franchise granted by the city council on June 28th. The company has engaged board for a large force of men and will begin construction work at once.

OMAHA, NEB.—The Plattsmouth Telephone Company is installing a 200-drop switchboard at the Live Stock exchange.

MONTGOMERY, N. Y.—There was a meeting here recently at which steps were taken for the organization of an Independent telephone company to construct a local system. A committee was appointed to investigate and report later. It is proposed to connect with the Orange County Telephone Company of Middletown, the Colonial Telephone Company of Newburg, and the Highland Telephone Company of Highland.

KENSAL, N. D.—A telephone line will be constructed from Kensal to McHenry.

MADISON, N. Y.—The Madison Mutual Telephone Company, which at present has 250 subscribers, has purchased the line between Morrisonville and Pratts and will use it in extending its system among farmers in that section.

ANN ARBOR, MICH.—The Washtenaw Home Telephone Company, which is an Independent company bucking the Bell people, has opened up connections with Jackson and will thus gain access to the western part of the State.

DULUTH, MINN.—The People's Telephone Company yesterday installed long distance service to Solon Springs. Hawthorne has also been added to the long distance line.

NICHOLS, N. Y.—At a meeting of the Nichols Independent Telephone Company several improvements were decided upon.

WATERVLIET, N. Y.—Mayor Hilton has notified the Home Telephone Company that it must have its local telephones in operation within one month or the franchise will be revoked.

KENSAL, N. D.—J. O. Johnson and H. A. Stonson, of this place, were in McHenry recently and made arrangements with business men of that town to construct an exchange to connect with the system at Kensal.

RATON, N. M.—The poles for 42 miles of the Johnson Mesa telephone line are in place, and by the 1st of August the line will be completed and in operation from Raton to Folsom.

SALEM, O.—A number of improvements will be made at the local plant of the Columbiana County Telephone Company under the direction of Manager C. Y. McVey, of Cleveland, and Manager W. F. Crossley, of Youngstown. A selective ringing system will be installed and a general overhauling of the entire system in Columbiana County. A new switchboard will be placed at East Liverpool having a capacity of 300 lines with 1,000 installed. A cable system will be installed at Seabring.

GAYSPORT, O.—B. D. Doan, of Young Hickory is constructing an Independent telephone line from Gaysport to Cannelville.

TORONTO, ONT.—A Government telephone line is now being built from North Bay to the Temagami district, along the line of the new Government railway. Train orders are given by telephone, and telephones are installed at the various gravel pits along the line. A Government telephone line is also being built from New Liskeard to Haileybury.

CORVALLIS, ORE.—Work on the new Independent line in this city has been somewhat delayed because of the inability to secure pins and cross arms.

LEHIGHTON, PA.—Jacob S. Hoffman is constructing a new line from Lehighton to Normal Square for the Lehigh Telephone Company. Contracts for a number of telephones at the latter point have been secured.

BROWNSVILLE, TEX.—The Brownsville Telephone Company has received its first load of poles. Manager Stegman announces that the system will be in partial operation within 90 days.

AUSTIN, TEX.—The stretch of country between San Antonio and El Paso is to be linked with the long distance telephone, a distance of 600 miles. The Huntington syndicate of California, which is promoting a long distance system from ocean to ocean, is to build the line and make connection with its holdings in Louisiana and Texas on one side, and New Mexico, Arizona and California on the other.

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TRADE NOTES

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., has recently closed a contract with Ferensen & Crawford, Malone, N. Y., for switchboard equipment.

THE VOUGHT-BERGER COMPANY, of La Crosse, Wis., has been awarded a contract for a switchboard and one hundred installations, by the Barre Mills Telephone Company, of Wisconsin.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY reports a rapidly increasing demand for its platinum electrode transmitters, especially through the Central and Middle Western States.

JULIUS ANDRE & SONS COMPANY, makers of electrical supplies, with offices 225 West Water street and works 187 Second street, Milwaukee, Wis., are ready to send their new catalogue to any telephone company on application.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY, of Meriden, Conn., report a big demand for their new and enlarged No. 8 catalogue, which is profusely illustrated with complete telephones and telephone parts. Every exchange man and electrical contractor should have a copy as the company has placed on the market many new and original telephone designs of a very high quality. Both bulletins and catalogues will be sent on request.

THE KNICKERBOCKER CONSTRUCTION COMPANY, of 15 Cortlandt street, New York, has been awarded the contract for the installation of the underground and aerial cables for the new Lewiston-Auburn (Maine) Automatic Telephone Company, amounting to over 100,000 feet. The cable is being manufactured by the Stromberg-Carlson Manufacturing Company, of Rochester, New York.

THE ROLFE ELECTRIC COMPANY, of Chicago, has issued a signed statement in which it gives notice that the license to manufacture under its patents by the American Electric Fuse Company has been revoked and transferred to Frank B. Cook, who now has the exclusive right to manufacture all circuit-protecting devices covered by patents granted or applied for owned by this company.

F. B. COOK, of 240 W. Lake street, Chicago, Ill., has issued a folder describing his No. 444 protector, also a type of test plug used for circuit-testing at the protector, and illustrations of the type L sectional and main distributing frames equipped with Strong sneak-current protectors. A very lucid description is given of the self-soldering heat coil which Mr. Cook manufactures and which is used in conjunction with the No. 444 protector. To all parties interested this bulletin will be mailed upon request.

G. M. GEST, the expert subway contractor, has been awarded the contract for the complete installation of an underground conduit system, including all the electrical distribution to service and house connections, for the South Bend Electric Co., South Bend, Ind. This work covers all of the main streets of that city and will be one of the most complete and modern conduit systems so far constructed. Work is to be completed at the earliest possible moment, and a large force of men will be employed on the construction. The Oliver Chilled Plow Co., which owns a private plant at the same place, has also contracted with Mr. Gest for the construction of its underground conduit system. While not so large as the system for the South Bend Electric Co., it will feed some of the most important parts of the city.

THE F. BISSELL COMPANY, of Toledo, Ohio, is the natural outcome of a wise and wholesome policy whose results are evident in the present progress of the concern, as shown by their last new wire catalogue. This catalogue embraces sixty-one varieties of wire, each of which represents many different gauges, thus making an exceptionally heavy total in this department. The range and assortment of the stock carried by the company is sufficient to entitle them unreservedly to the business of the community. Brains and enterprise have a cash value in these days, and there is no better way to testify to their existence than in the treatment of a business proposition relating to a special branch of trade. In this respect the F. Bissell Company has shown a special aptitude. Its wire catalogue with the extensive line of goods presented there, is certainly a good drummer, whose eloquent silence preaches quality and variety at all times.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR TRADE.—Good farm, well improved, 241 acres; value, about $12,500; for paying telephone plant. Address, Box 457, Oxford, Ohio. 218

FOR SALE—Several pieces of lead covered cable, in good condition, ranging from 15 to 150 feet in length; sizes, 50 pr., 100 pr., and 150 pr. Just the thing for small telephone companies bringing their lines into the office. Address, Box 224, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 224

FOR SALE CHEAP—Five switchboards of magneto express type, in good condition. Just the thing for small exchanges. Address, Box 225, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 225

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

I WANT TO LEASE a telephone plant in a live, prosperous city; one that is not earning up to expectations. Can make it pay good interest to owners. I have references and money to back me. Address, Box 219, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 219

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED—Position as manager, assistant manager, or foreman of construction. Am 29 years old, have had 6 years' experience in all branches of the telephone business. Have best of references. Lock Box 106, Walhalla, S. C. 222

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

WANTED—Telephone man as manager for exchange of 300 generator call telephones. One who is capable and willing to do the trouble work and all work connected with such exchange; construction first-class, Middle West. Address Box 227, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City.

WANTED—Position as Switchboard Repair Man or Wire Chief. Seven years' experience with Bell company in the above line; at present employed by Bell company in a large city; would like to make a change. Address Box 228, THE AMERICAN TELEPHONE JOURNAL, New York City. 228

POSITION WANTED.—Age 25; married; five years experience; want superintendency where I can work. Address, Box 220, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 220

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

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ANOTHER OF OUR GOOD POINTS

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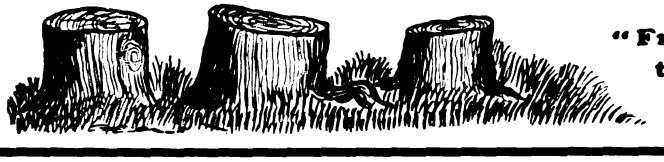

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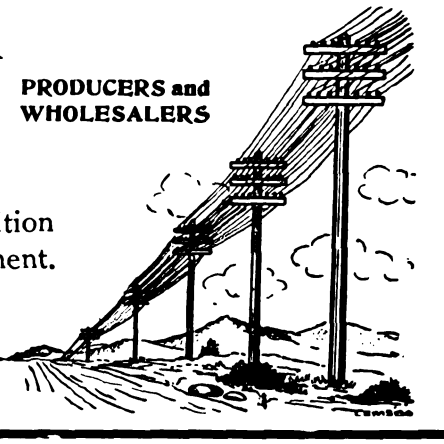

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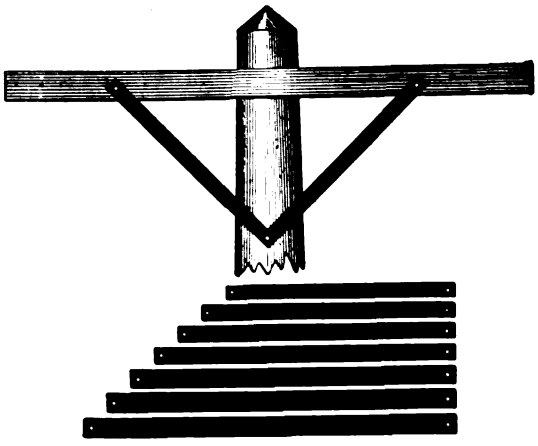

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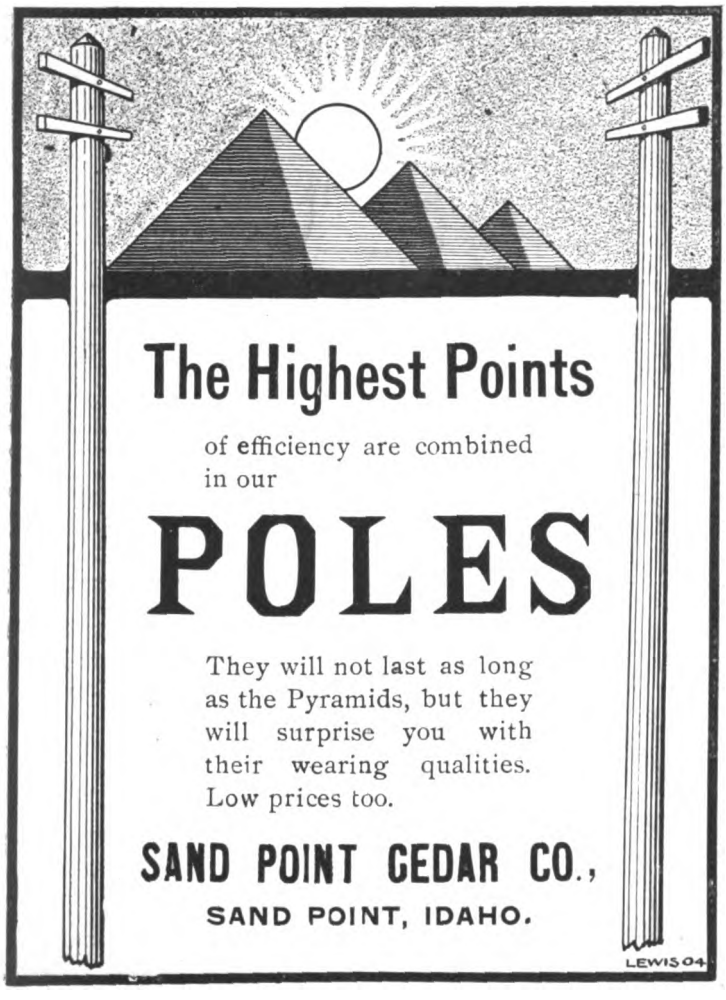

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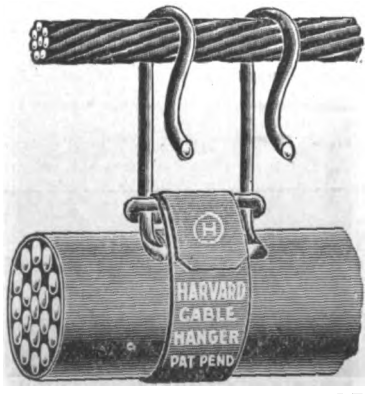

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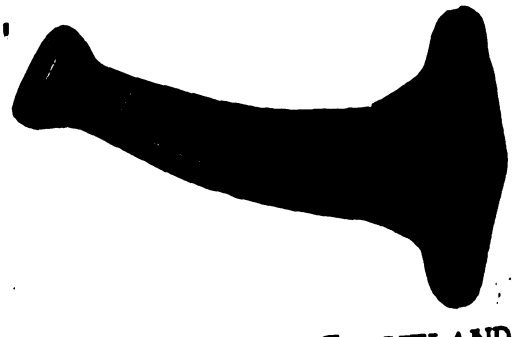

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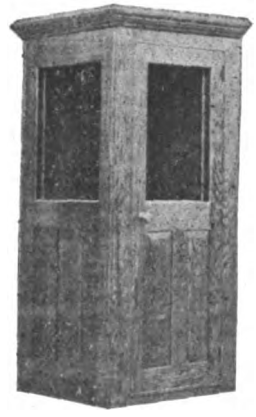

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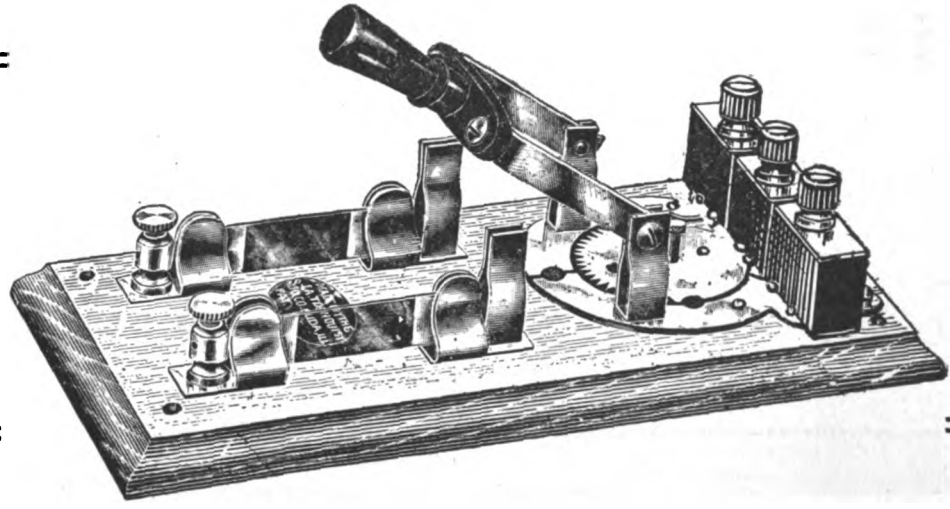

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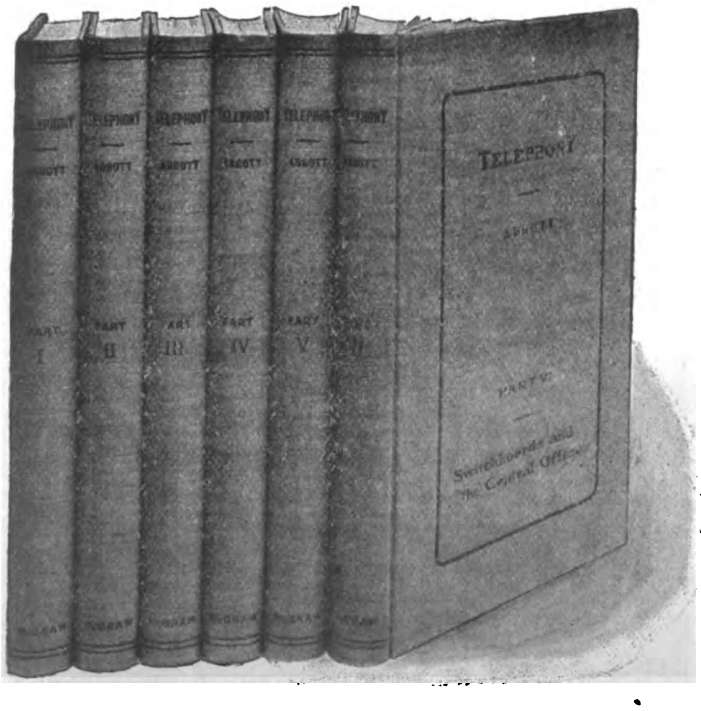

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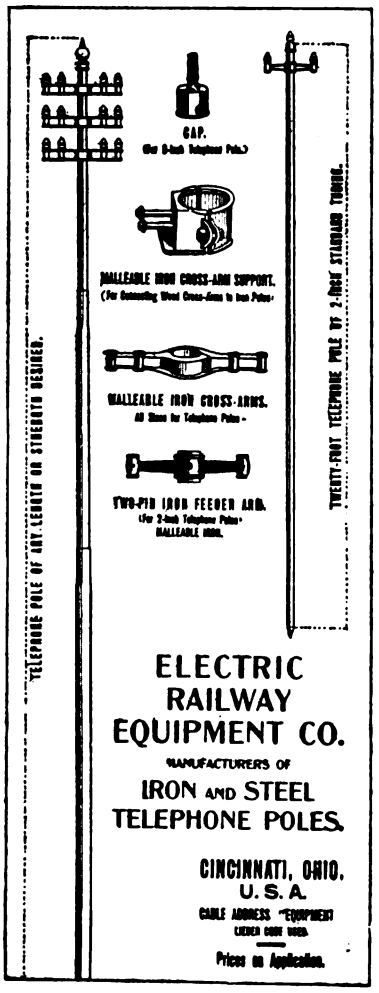

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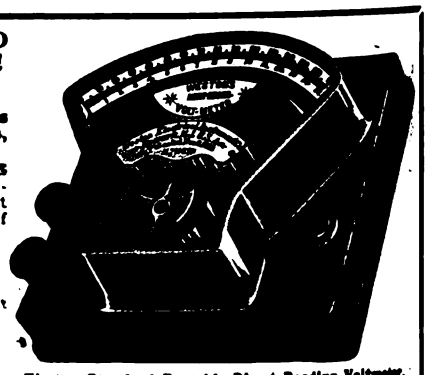
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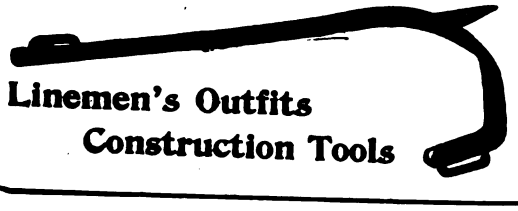

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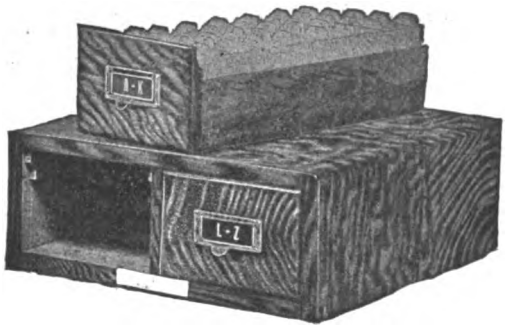

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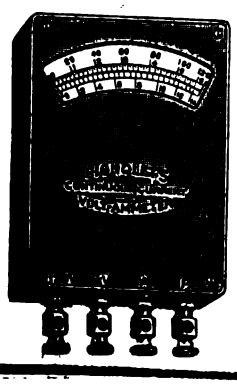
CONTINUED ON PAGE 37.

You Will Find It Pays To Test



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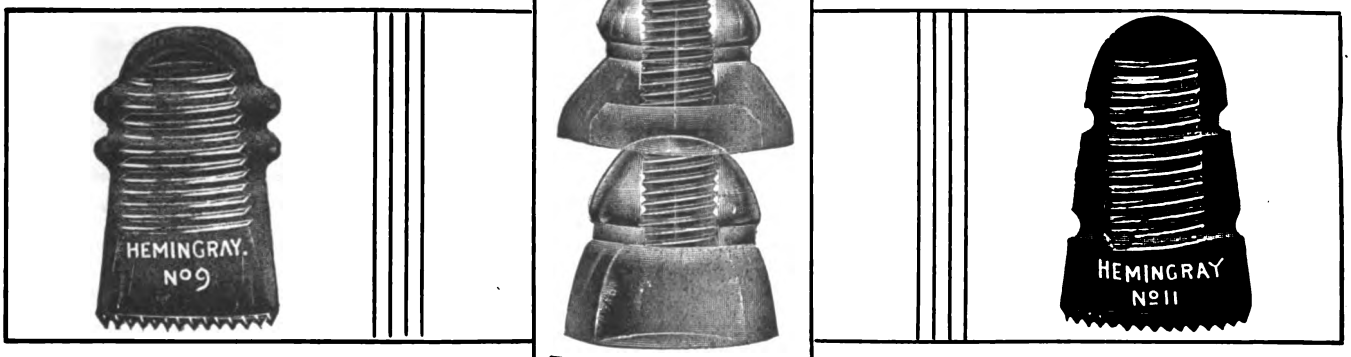

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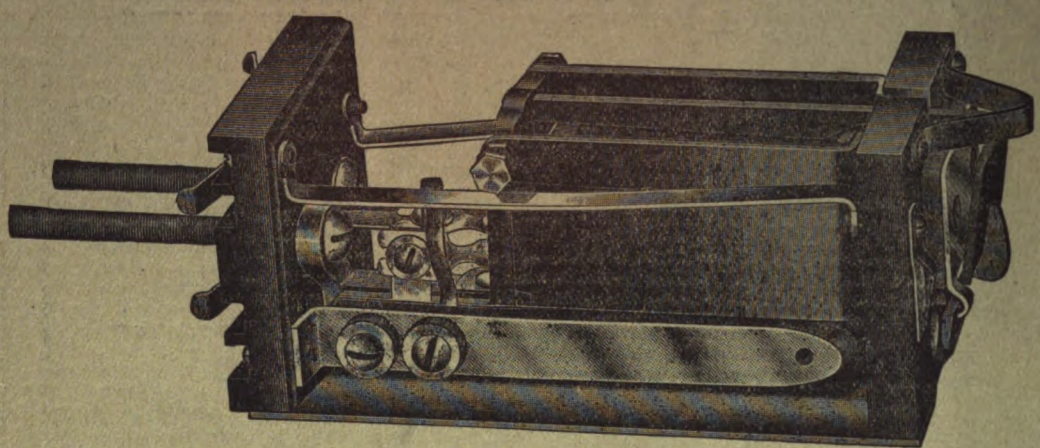

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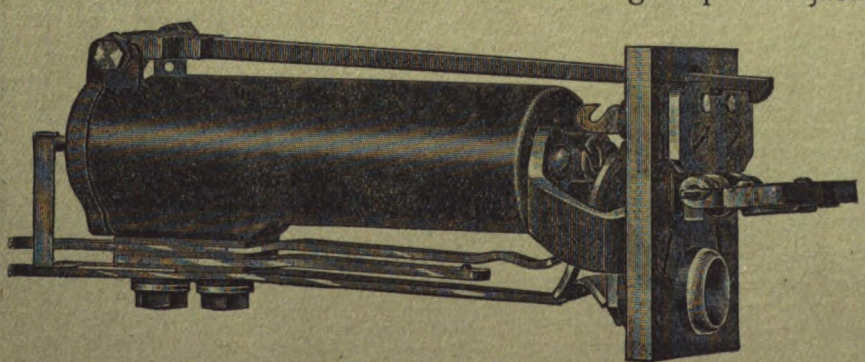

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Mr. Adams' letter also goes to show that manufacturers and supply dealers should be represented in every number of a paper that is so interesting to its readers.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Volume 10 NEW YORK—AUGUST 20, 1904—CHICAGO Number 8

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Advertisers' Directory, Page 9

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SOME REMARKS ON INSTRUMENT SETTING.....By B. C. WILHELM
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The Operating Field:

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CITIZEN'S COMPANY OF COLUMBUS INCREASES STOCK ISSUE
TELEPHONES IN PERSIA
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FLORIDA TELEPHONE DEVELOPMENT
NEW SWITCHBOARD FOR TIFFIN INDEPENDENT COMPANY
CONSTRUCTION STARTED ON SAN DIEGO INDEPENDENT SYSTEM
THE TELEPHONE IN THE COURTS

QUERIES THE EDITOR'S PAGE PATENTS.
THE WEEK'S MESSAGES TRADE NOTES
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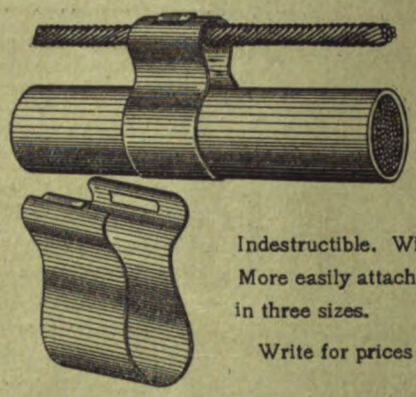

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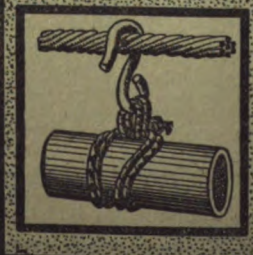

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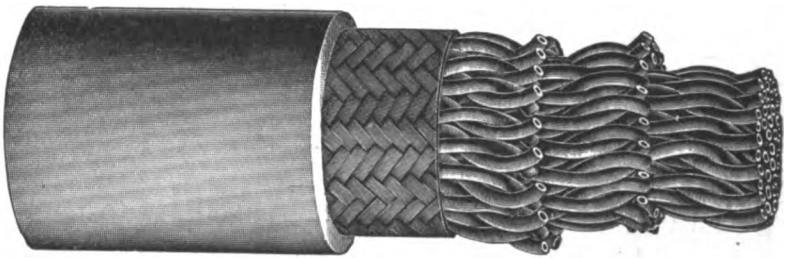

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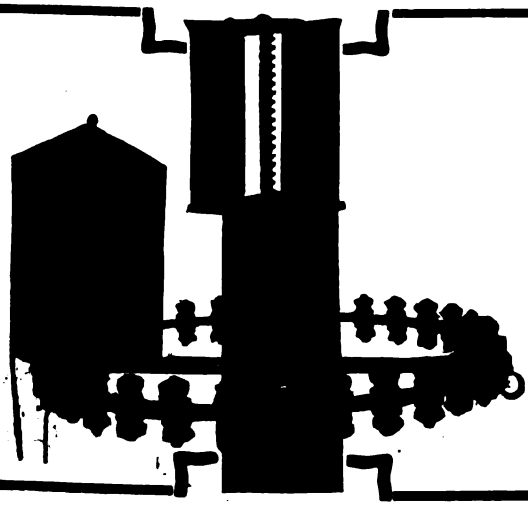

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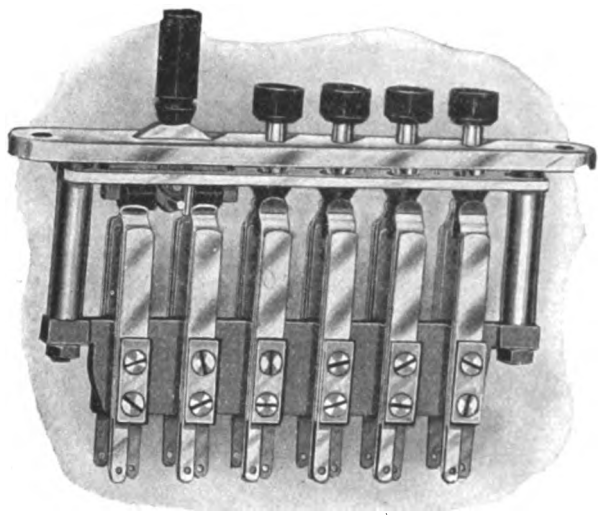

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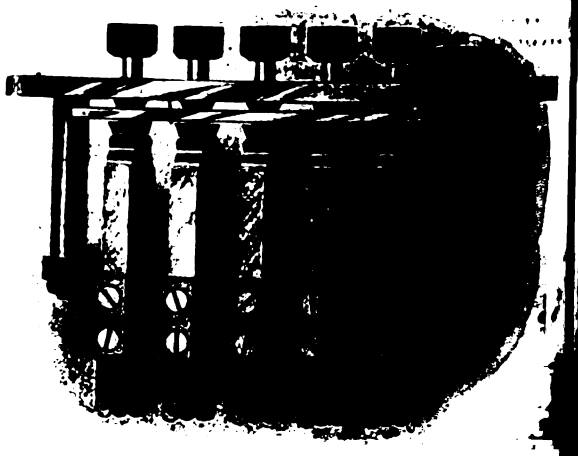

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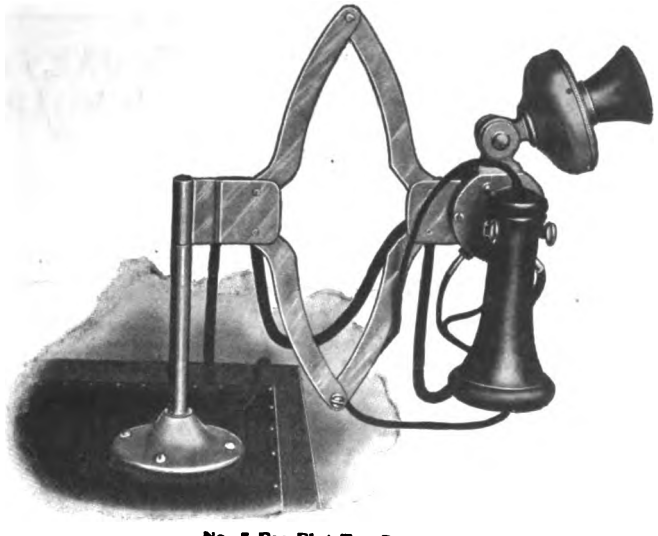

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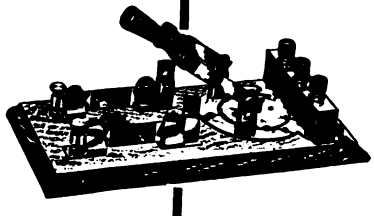

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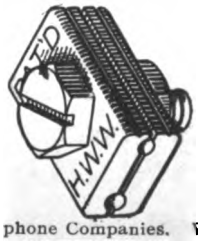

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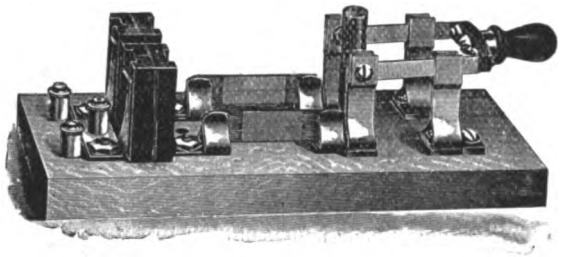

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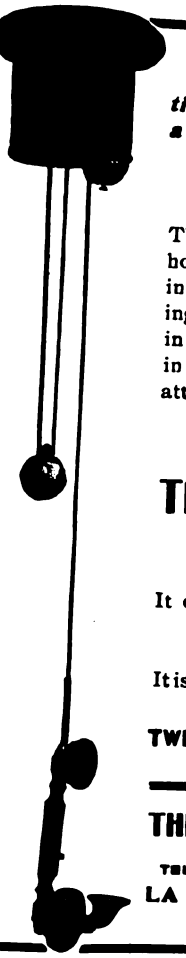

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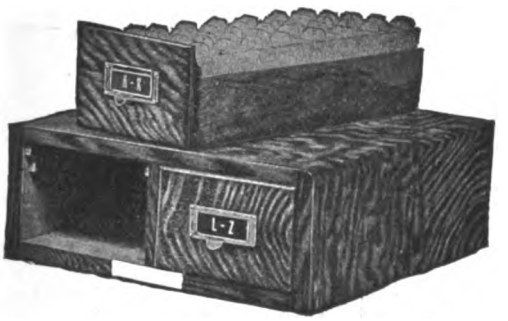

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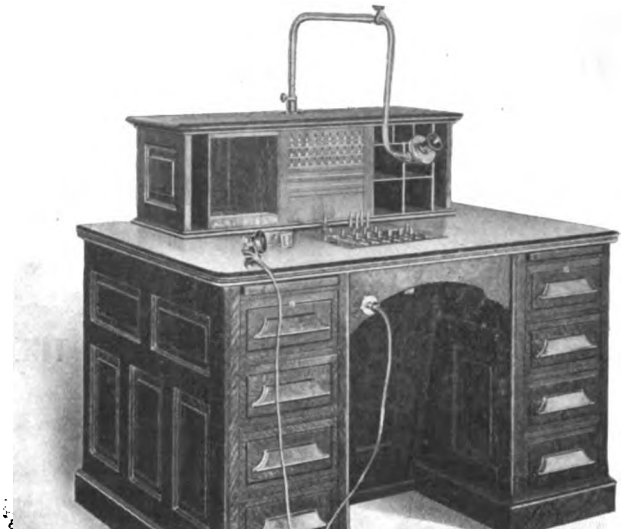

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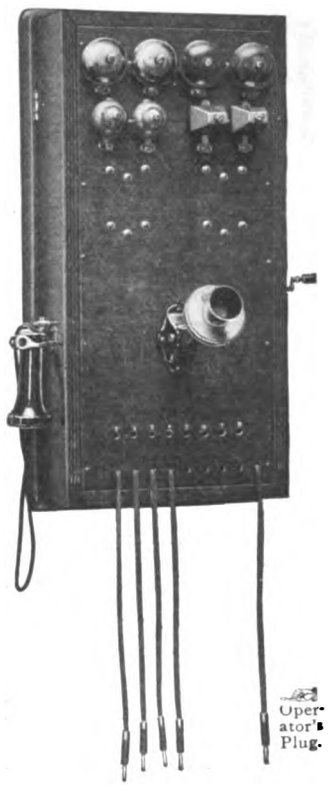

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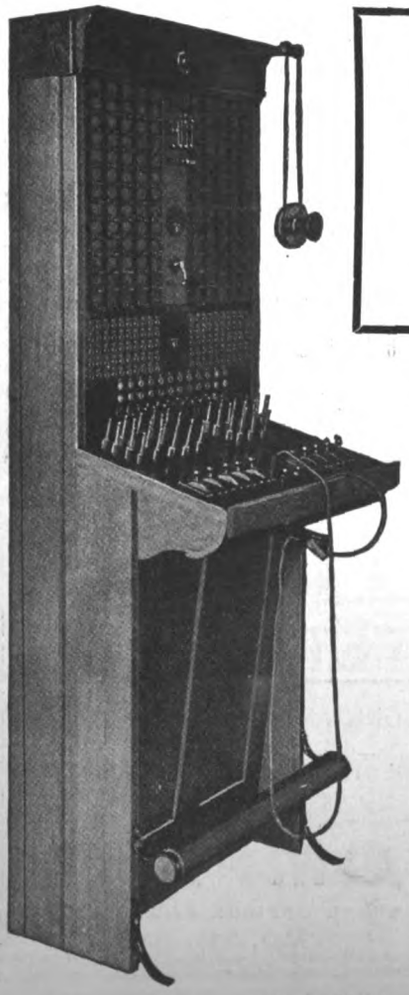

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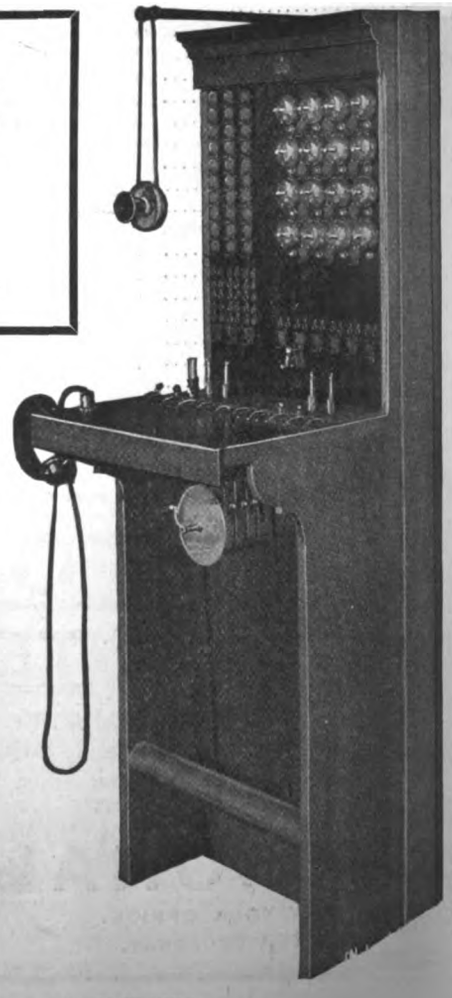

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"TRIED AND TRUE"

Full of Good Points—It's just what you want. You can Inspect the Switch without removing the Receiver.

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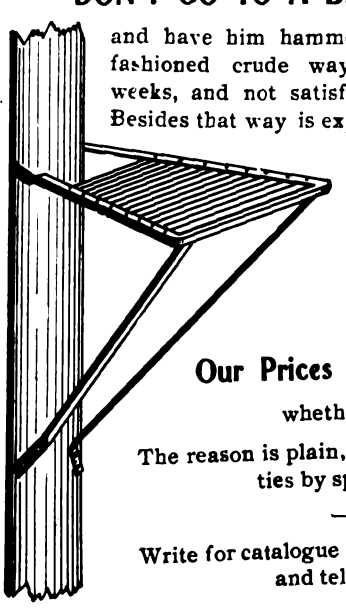

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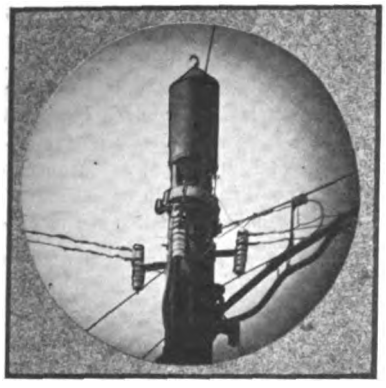
VOLUME 10 SATURDAY, AUGUST 20, 1904 NUMBER 8

MULTIPLE CABLE DISTRIBUTION

ARTICLE II.

By Edward A. Tyler.



THERE is another method of distribution from either underground or aerial cables, called "block" distribution. When this means is employed the cable to the block distributing pole can run either underground or on a pole line and the distributing pole is placed within a block as near the center as possible. Fig. 5 illustrates a loop box and a ring pole for block distribution. In block distribution the terminal boxes are usually of a larger capacity. This is because one pole has to serve a larger number of subscribers. As an illustration, assume a distributing pole in the center of a block. On each side there are the rears of houses that face on four streets. If the blocks are long it is evident that the number of possible subscribers' lines that will terminate at this pole is larger than the number that would usually do so on a loop line. In the latter case, if the number of subscribers became great enough, it would be a comparatively easy matter to tap the cable at some intermediate point and install a new terminal, whereas in the case of block distribution, if the possible growth had not been carefully estimated and a good margin of cable spares and terminals made available, an expenditure would be necessary to take care of new lines. The writer is acquainted with one instance in which half a dozen new contracts were delayed nearly four months because the block distribution was not large enough, and it was impossible to run in new cable on account of lack of right of way. Fig. 8 is an illustration to show one advantage to be gained by means of aerial distribution. Had open wire been employed it would have necessitated the running of insulated wire for a long distance on account of trees, and it is doubtful whether there could have been enough tree trimming to allow running the same number of open wires. The cable records for the system being described have some characteristic features.

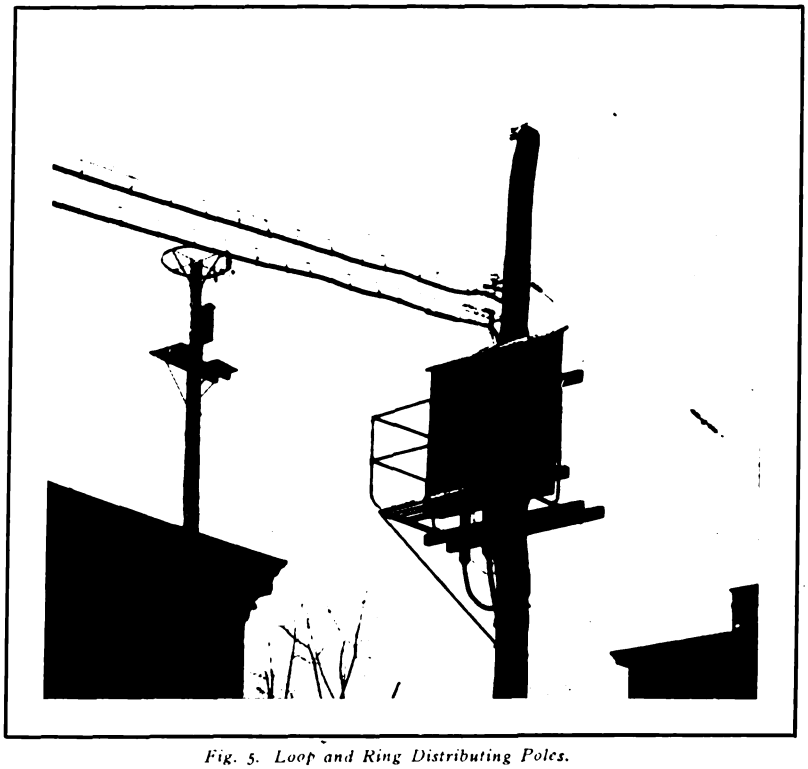


Fig. 5. Loop and Ring Distributing Poles.

The great value of multiple cable distribution is flexibility, and it is evident that the details of the various circuits, such as location and availability, must be clear and concise. With this end in view the form shown in Fig. 7 is suggested. The exchange is called Gerrard, and the underground cable No. 26. As four party line service is employed, opposite each cable pair number are four cross rulings which serve as a record of each party's connections on that line. The first vertical column is the loop column and the successive columns are for the distributing poles. Vertical lines are drawn through the spaces occupied by the various pairs to indicate the loop and distributing poles at which they appear. Referring to Fig. 7, the line under the loop pole heading passes through all the pairs, which shows that G 16 loop is common to all those pairs. This method of indicating the cable boxes at which the various pairs are available is both simple and easily understood. Another scheme sometimes employed for the same purpose is to use a mark such as a cross, but this method of designation is liable to lead to confusion, especially when the work of locating pairs is to be done quickly. Since each page of the cable records is the same there are generally from 10 to 20 vertical columns for distributing terminals according to the extent of the loop line. The size of the page varies, but 25 is considered an efficient number of lines to record on one page. In the illustration only ten are shown.

In the column under G 16-10 the vertical line passes through all the pairs from 1 to 10, indicating that they appear at this point. Pairs from 1 to 5 appear at pole G-16-20, and 2, 5, 8 are connected to the terminal box G 16, 25. Besides these terminals there are two others marked G-16-30 and G-16-40, at which none of the pairs shown appear. There are also four other spaces for terminal boxes which may be installed at some future time. In making provision for such a contingency a great deal of trouble is saved in making new records. The column to the extreme right is for the line order number under which the work of building the subscribers' lines is done.

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In making the record of a new line it is customary to write the name, address and line order number in pencil, and to put a pencil mark opposite the party's name under the heading of the terminal to which his line is connected. In the case of cable pair No. 1 there are two parties *a* and *y* connected up, the *a* party being connected to terminal G-16-10 and the *y* party to G-16-20. In like manner the circuits of the other parties are indicated. By using pencil it is a comparatively easy matter to change the records at any time when necessary without mutilating the sheet.

If at any time a pair tests faulty it should be marked on the record. First, so that it may not be assigned for a new connection, and' secondly, to show the number of bad pairs in a cable. If the trouble cannot be cleared its location and nature should be written as a reference. When the trouble is cleared then the record should be rubbed out so as not to cause any delay. When a party on a line moves away to a point where it is impossible to use his old line conductors there are two options. One is to assign a new number and the other is to find out if making a drop will enable the old number to be used. As an illustration refer to Fig. 7 and use call number 1268*a* now working on pair 8 out of terminal G-16-10. This party moves to a location which is served from G-16-20 pole. At this pole pair 5 appears as well as at G-16-10 and G-16-25; now all that is necessary to do is to change the other parties from pair 8 to pair 5 at their respective terminals and for the wire chief to have the jumper on the main frame changed from 8 to 5. It often happens that two or more call numbers have their cable pairs changed to make room for a new subscriber.

DISTRICT GERRARD.

UNDERGROUND CABLE NO. 18.

G 12	Loop	Main Street	and	Clinton Street	
G 12-10	Terminal	"	"	"	Allegheny Avenue
G 12-15	"	"	"	"	William Street
G 12-22	"	"	"	"	Norman "
G 12-30	"	"	"	"	Clarendon "
G 12-40	"	"	"	"	Clark "
G 12-45	"	"	"	"	Fayette "
G 12-50	"	Jefferson	"	"	State "
G 12-55	"	"	"	"	Argyle "

Fig. 6. Terminal Record.

Besides the cable book another important set of records is that which gives the location of the various cable lines with loop and distributing poles. These are sometimes kept on cards or in a book especially ruled. Each underground cable should have a number of sheets by itself, each sheet being devoted to one loop line, under which heading the various terminal poles are marked. A specimen page is shown in Fig. 6, which will give a general idea. If a new contract is secured near Main and Norman streets, the wire chief looks up the terminal record and finds the nearest distribution pole. Turning to the cable record he can easily decide which pair to use.

From the foregoing it will be easily understood that the records of such a system form a most important adjunct; it is therefore necessary that they should be accurate, to enable the plant to be kept at the highest point of efficiency. Time and labor are very important factors in the successful operation of any system, and since to a great extent their values rely upon the accuracy of details, it is evident that they should be carefully arranged.

Gerrard DISTRICT

FEEDER CABLE 26

CABLE PAIR	G16	G-16-10	G16-20	G16-25	G16-30	G16-40	CALL NUMBER	NAME	LOCATION	LINE ORDER NUMBER
1							867 a	Chas Halsted	112 Pionier St	2768
							b			
							x			
			✓				y	A K Drescher	139 Sherman Ave	2854
2				✓			1324 a	J L Morgan	119 Pionier St	1632
			✓				b	N R Whitman	23 Clinton Ave	2209
			✓				x	R A Manson	31 " "	2217
							y	A S Libbey	117 St Charles St	2405
3		✓					1159 a	W H Mack	22 Sherman Ave	1223
							b			
		✓					x	P P Rogers	77 W Kinney St	2105
							y			
4								Shunted in the underground		
5										
6							752 a			
							b			
		✓					x	D A Johnson	26 Sherman Ave	1937
							y			
7										
8		✓		✓			1268 a	C H Belmont	128 St Charles St	2542
							b	W M Clark	131 Pionier St	1868
		✓					x	H K Rooney	129 Clinton Ave	2560
							y			
9										
10										

Fig. 7. Cable Record.

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THE INSTALLATION OF TELEPHONE CABLES.

H. J. MINHINNICK.

BEFORE commencing the work of installing cables the superintendent may profitably reflect on the marvelous perfection and delicacy of the thing he is about to handle. A telephone cable having from 20 to 600 pairs with each conductor, showing an insulation resistance of several thousand megohms per mile, and any required electrostatic capacity from .08 to .12 microfarads per mile, is a triumph of modern engineering and manufacturing skill. This perfection of detail has been secured only at the cost of unremitting care at every stage of the manufacturing process, and if the cable, after final installation, is to remain in as good condition as when received much care and attention must be given during erection. While a modern cable will stand a vast amount of abuse without completely breaking down, every injury weakens it in some vital point. For instance, the electrostatic capacity depends largely on the amount of free air which separates the conductors—in other words, the looser the core the lower the capacity, and kinks, bends and flattenings which jam the sheath tightly against the core rob the cable of part of this, its most valuable feature, besides materially weakening the insulation resistance.

Beginning with unloading the reels, the too common practice of allowing them to run down an incline from the car or loading platform to the ground and bring up with a jar against blocking or other obstructions cannot be too severely condemned. They should be slacked down slowly and carefully so that no flattening of the sheath can possibly occur. The same precautions should be taken in loading and unloading the cable wagon. Under no circumstances should a cable be left alone with the sheath exposed. Lead pipe seems to present an irresistible attraction to the small boy and the loafer with their jack knives. The reel, if open, should be carefully and completely covered with a tarpaulin or, better still, a man left to watch it.

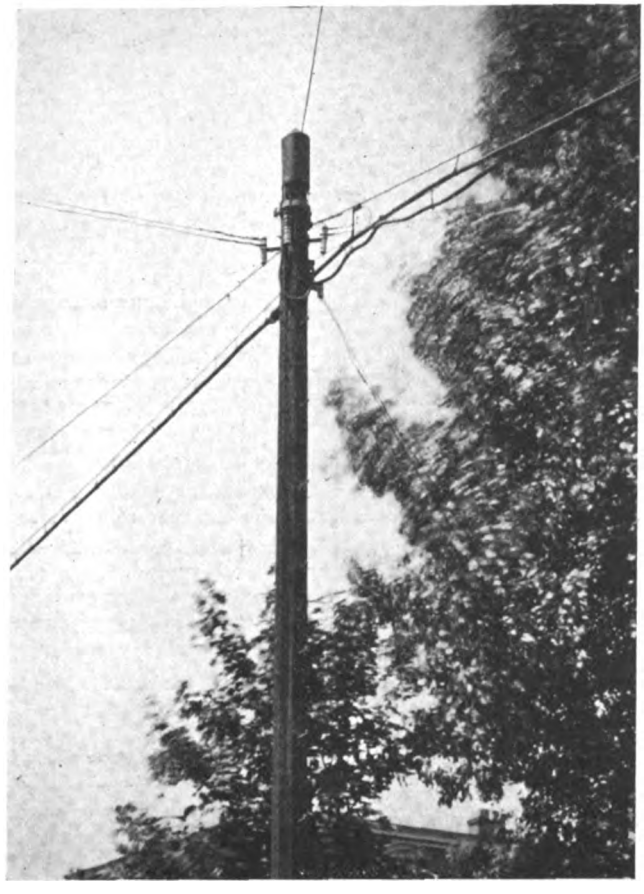

Fig. 8. Advantage of Multiple Cable Distribution.

"Multiple Cable Distribution." See preceding page.

In case of a large installation it will be necessary to store the reels till needed, and care must be taken that they are protected from wanton damage. In smaller installations the reels may be hauled at once to the spot where they are to be used, but in either case the time and place to test the cable is just before putting it into position and as near the scene of operations as possible.

No cable should ever be used without being first tested for grounds, crosses, continuity, capacity, conductor resistance and insulation resistance. The manufacturer guarantees that the cables leave him in perfect condition and, in case of future troubles, may take the ground that the damage was done in the process of installation. Hence the necessity for at least the simpler tests which are within the abilities of every cable user. The only apparatus required for such examination is three or four cells of dry battery and a good telephone receiver of the watch-case pattern fitted with a head band. If desired the battery may be increased to ten cells or more, and a galvanometer substituted for the receiver, but in either case the connections are the same. The sheath should be removed from both ends of the cable for about 6 inches and the core boiled out in paraffine. The conductors at one end are then carefully separated and spread out so that each is clear of all the others and the sheath. To effect this it will probably be found necessary to clip a short piece off each one. The conductors at the other end are stripped of insulation for 3 or 4 inches and bunched together, and a bare wire is wrapped closely around the sheath and the bunch of bare conductors running thence to one pole of the battery, the cells being connected in series. From the other pole of the battery a wire is run to one binding post of the receiver and to the other post is connected the testing wire. The man making the test places the receiver at his ear and withdraws one conductor from the bunch and touches it with the bare end of his testing wire.

The circuit is now as follows: (1) From the battery through all the conductors and also through the sheath of the cable to the open circuit at the far end; (2) from the battery through the receiver and the wire under test to the same open circuit. In other words, there is no circuit unless the wire being tested is (*A*) grounded to the sheath, or (*B*), crossed with some other conductor. Either of these conditions will cause the battery current to flow through the receiver, making a click more or less loud as the resistance of the ground or cross is great or small. It is to be remembered that on first touching the wire under test a slight click will be heard. This is caused by current flowing to charge the conductor owing to its electrostatic capacity. If, however, the conductor is free of ground this capacity click will entirely disappear after the second or third touching of the wires. If any click, no matter how slight, persists after repeated touchings the conductor is faulty and should be so marked. Succeding conductors are withdrawn one at a time from the bunch and the same process repeated till all have been tested. If a faulty conductor be found it should be replaced in the bunch until all are tested, as other wires may be grounded to it and, unless it were kept in circuit, these wires would test clear. Before marking a conductor faulty it is well to examine all connections and the open end of the cable to be sure that the fault is really in the

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conductor and not in the apparatus or connections. If a galvanometer be used, on first touching the wire under a test a slight deflection will be observed due to capacity but subsequent touchings will not affect the needle if the conductor be clear. A permanent deflection indicates a fault.

The next step is the test for continuity. Reduce the battery to one cell and replace all conductors in the battery circuit as at first. Attach a pair of small cutting pliers to the testing wire and, taking the conductors at the other end of the cable, cut them one at a time. It is evident that the circuit is closed every time a wire is cut and that fact will be announced by a loud click in the receiver. The absence of this click denotes a broken wire. The foregoing tests can be made very rapidly, for four cells of battery will cause a perceptible click in a good receiver, or a galvanometer deflection, through an enormous resistance, and for rough testing no better method can be adopted.

Testing completed, the ends of the cable are cut off and sealed, for the only way to close the end of a cable is to solder it perfectly. The conductors should be driven down half an inch or more with a punch and the sheath neatly hammered down; then make a depression in the center of the end of the closed sheath with the punch, scrape the end bright with the shave hook, flux with tallow and see that the solder flows so as to close every part.

The tests for insulation resistance, capacity, etc., will not be gone into as they have already been elaborately discussed in these pages in the articles on electrical measurements by Mr. Arthur V. Abbott.

SOME REMARKS ON INSTRUMENT SETTING. ENTRANCE TO BUILDINGS.

By B. C. Wilhelm.

In bringing the line into the subscriber's premises the following rules must be observed: 1. The two conductors forming the circuit must be separated by at least 3 inches. 2. The holes through which the wires pass must slope upward as they pass towards the inside at an angle of 20 degrees to the horizontal. 3. The holes in question must be bushed with hard rubber, porce-

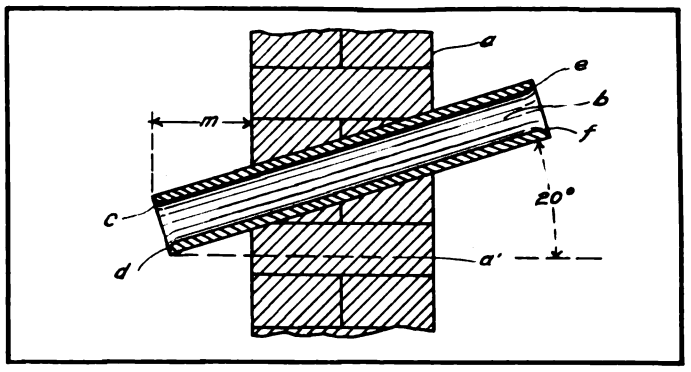

Fig. 1.

lain or some one of the fireproof insulating bushings that are on the market. The material used for the purpose of bushing the holes must, in addition to insulating qualities, possess sufficient strength and rigidity to withstand mechanical shocks, and be impervious to moisture.

Considering all the points in question, porcelain is the best material to use. In insulating qualities hard rubber is superior,

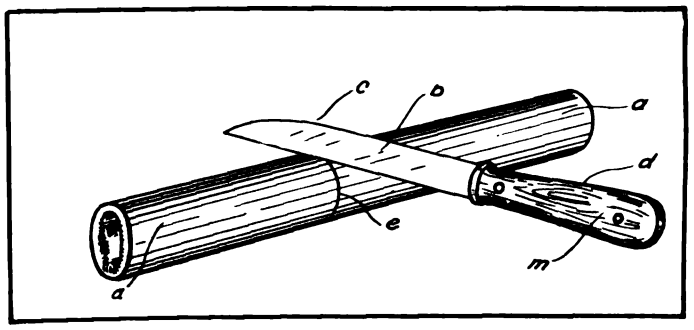

Fig. 2.

but it is much more frail than porcelain, and therefore more liable to be broken.

The holes drilled through the building for the reception of the busihngs must be of the proper size to make a binding fit, so as to prevent the rain from finding an entrance between the outer surface of the tube and the inner surface of the hole, into the interior of the premises. After the wire has been drawn into place, rubber tape must be wound around the wire and the end of the tube, to prevent the rain entering the space between the wire and the inner surface of the bushing.

In Fig. 1 is shown a hole bushed with hard rubber. Here the section of the wall is shown at *a a'*, and the tube at *b*. The dotted lines enclosing the angle of 20 degrees show the proper inclination. The distance of the end of the tube from the outer surface of the wall, denoted by *m*, should be about 3 inches. This tubing comes in lengths of about 2 feet, and it is customary for the instrument setter to "draw" enough of this material to suffice for a day's work; so that he must cut it up into the requisite lengths as he uses it. He can do this either with a hack saw or a sharp pen knife. In Fig. 2 is shown the method of cutting with a knife. The tube *a* is placed on a table, or other suitable flat surface and the knife blade *b* is pressed against it by grasping the handle *m* at *d*. The other hand is pressed down at *c* and the tube rolled along the table until a circular knick *e* is

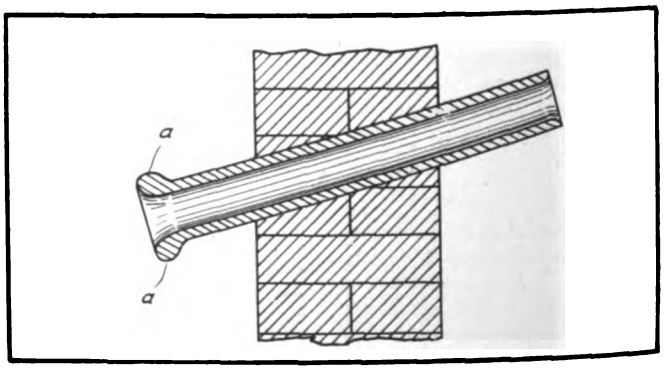

Fig. 3.

cut. When this knick has attained the depth of about 1/16 inch the tube is grasped at both ends and bent. If the knick has been properly cut, the tube will break cleanly at that point. If the hard rubber be heated slightly it becomes soft, and is much more easily cut. This practice, however, has the disadvantage of flattening the tube unless it is done very carefully. The instrument setter should never attempt to break the tube by striking it, as hard rubber is very brittle, and when so treated will shiver into fragments with ragged edges.

Turning again to Fig. 1, it will be seen that the inner edges of the tube are reamed out at *c, d, e* and *f*. This should be done with the knife, after it has been cut to the proper length, in order to remove the sharp edges which would otherwise cut the braid on the wire when it is pulled into place.

In Fig. 3 is shown a hole bushed with a porcelain tube. It will be seen that the tube is constructed with a swelling *a* at one end, and the edges are curved to prevent the braid covering of the

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wire from being injured as the wire is pulled through. Porcelain tubes cannot be cut by any of the tools that the instrument setter may have at his disposal, so that when this form of bushing is used a tube of the requisite length must be procured.

In Fig. 4 is shown the method of running the wire through the hole. Here the walls shown at *a a'*, and the tube at *b b'*. The wire is shown coming down from above at *c*, being held in place

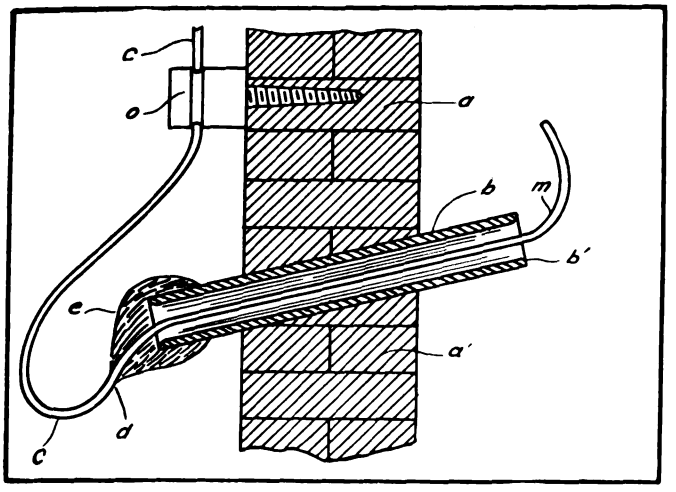

Fig. 4.

by the split knob insulator *o*. It bends around at *c'* into the drip loop *d*. The layer of rubber tape, alluded to above, is shown at *e*. The wire passes through the tube and bends up at *m*.

When the protection apparatus is placed upon the outside of the building, the drop wire ends at this point, and the line is carried inside by means of leading-in wire. The method of doing this is shown in Fig. 5, where *a* represents the drop wire coming down the side of the building, being supported on split knob insulators and entering the iron box *b* surrounding the protection. The ground wire is shown emerging from the center hole in the bottom of the box, and running to the earth on the regulation insulators. The two leading-in wires *c c'* are brought to the two bushings *d d'* and taped in the proper manner. The drip loops are shown at *n n'*.

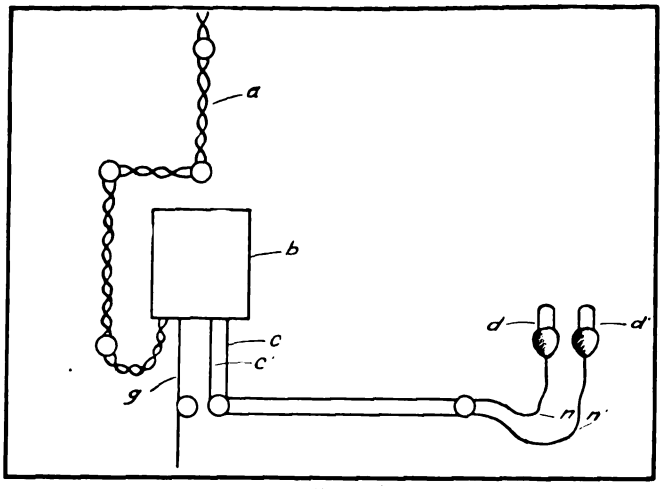

Fig. 5.

The ground wire should never be brought into the building, wherever it is possible to secure a good ground outside. In some cases it is necessary to break this rule, in order to obtain a good ground connection. When it is necessary, however, the entrance must be effected through a separate hole, bushed in the manner already described, and the end of the bushing taped in the regulation manner mentioned above.

ELECTRICAL RESISTANCE AND MEASUREMENTS.

By E. L. Hardin.

THE telephone business, more than any other, necessitates accurate and varied measurements, and the average engineer and electrician may quite readily acquire the knowledge and skill to make the ordinary tests that are necessary with the various instruments which have been designed to meet the different requirements. The practical telephone electrician has to measure electrical resistances, electro-motive forces, capacities of condensers, cables, etc., and each of these several quantities is measured by comparison with certain standards which have been ascertained by repeated experiments. However, we will only consider the measurement of resistances.

Resistance may be defined as that which limits the flow of electricity in a circuit, due to its length, cross section and the material of which it is composed.

For instance, a wire of a certain size of iron or copper will not have the same resistance for 100 feet as for 1,000 feet. Neither will 100 feet of copper wire of a given size have the same resistance as 100 feet of iron wire of the same size. In other words, the greater the length of wire, other things being equal, the greater the resistance, and the greater the cross section of the wire the less the resistance. As far as the geometrical dimensions are concerned the relationship is rigid and scientific, but when we consider the material of which the wire is composed data obtained from direct tests is the only reliable information at the disposal of electricians. Copper, iron, aluminum, and in fact all the metals differ from each other in resistance for equal lengths and equal cross sections.

This is entirely due to their difference in character and has not as yet been explained. It is also known that if a metal is heated its resistance increases, and if it is cooled its resistance diminishes.

It has been necessary to adopt some standard of resistance by which all other resistances will be compared and their value estimated.

From a practical every-day standpoint it might be said that 1,000 feet of No. 10 copper wire, B. & S. gauge, would represent an ohm, but this is not an absolutely accurate value. The exact value of the ohm may be obtained from a column of mercury 106 centimeters high with a cross section of 1 square millimeter. It is a matter of importance for all serious students of electrical tests to make a thorough study of the standards of resistance.

There are four units at present, namely, the Siemens unit, the British Association unit, the Legal Ohm, whose value has just been given, and the last and most accurate, called the International Ohm.

The only difference between the Legal Ohm and the International is not in the cross sections of the mercury columns, both being 1 square millimeter, but in the length of it. In the Legal Ohm this is 106 centimeters; in the International Ohm, 106.3 centimeters. A centimeter is about .4 of an inch and a millimeter 1-25 of an inch, for purposes of ready reference.

Resistances in a circuit may be of two kinds: First, the resistance of the conductors themselves; second, the resistance due to imperfect contacts from which a large percentage of the common telephone troubles find their origin. In order to measure resistances the law of resistance, commonly called Ohm's Law, must be known. This law, discovered by Dr. George Simon Ohm, is the cornerstone of that structure represented by all the theory and practice in electrical engineering. Ohm's law may be stated either verbally or symbolically in algebraic characters. Is is as follows: The current in any circuit is proportional to the electromotive force and inversely proportional to the resistance. By this is meant that the flow of current will increase if the volts applied to a circuit are increased, and the current will diminish

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if the resistance of a circuit is increased while the volts remain constant. This relationship is shown by the formula,

amperes = volts ÷ ohms; or if C = current in amperes; R = resistance in ohms; and E = electromotive force in volts. Then $E = CR$ or $C = \frac{E}{R}$ or $R = \frac{E}{C}$. Knowing any two of these we may find the third.

These facts may be tabulated in the following manner:

Amperes = volts ÷ ohms.
Volts = amperes × ohms.
Ohms = volts ÷ amperes.

In getting amperes volts are divided, and in getting ohms volts are divided, in one case by ohms and in the other case by amperes.

The resistance of a conducting body may be measured in many ways, but there are three principal methods in practical use. First,

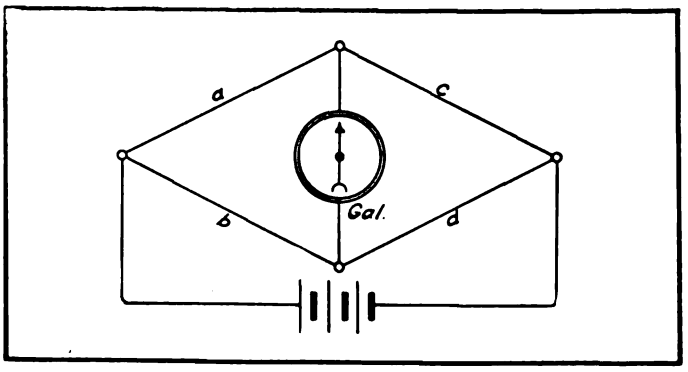

Fig. 1.

by the use of the Wheatstone bridge, slide-wire bridge and the direct reading ohmmeter, which are only modifications of the Wheatstone bridge. Second, by the fall of potential method, which is done with a voltmeter. Third, by the use of a sensitive or high-resistance galvanometer in series with a battery, generally used to measure high resistances such as the insulation resistance of wires and cables.

For general resistance measurements the Wheatstone bridge and voltmeter tests are most suitable, being very accurate, and with little practice great skill may be attained in using these instruments. To understand the working of the bridge, one should understand the underlying principles of its construction. The two laws upon which it is based is first, that no current will flow between points of equal potential; and secondly, the drop of potential along the various parts of a conductor is proportional respectively to the resistances of those parts.

The idea to be conveyed by the phrase "drop of potential" is expressed by that form of Ohm's law known as $E = C \times R$. If two circuits are of equal resistance they will carry the same current when the same electromotive force is applied. At points midway in each circuit a point will be found at which the "drops" are equal. The reason is obvious, when the resistance and current in each current is considered.

Suppose two circuits are connected together at their ends. If both are of copper and of equal length and cross section the same current will flow in each when a battery is connected to the aforesaid ends. An indicating instrument, such as a galvanometer for instance, connected to the middle of each wire, will show no current because the $C \times R$ effect in each up to that point is equal.

This is understood from the sketch, where we have *a c* as one wire and *b d* as the other wire, at the middle of each of which a galvanometer is connected. If *a c* is 10 ohms and *b d* 10 ohms then a current of 5 volts send ½ an ampere through each branch. If the arm *a* represents 5 ohms, the drop in it up to the point where the galvanometer is connected will be $5 \times ½ = 2½$ volts drop. This is also true of the *b* arm, whose drop is likewise $5 \times ½ = 2½$ volts. It is easy to see that with 2½ volts at each connection the galvanometer takes no current. If, however, the resistances of *a* and *b* are different, and also *c* and *d*, then a new principle must be employed, upon which the use of the Wheatstone bridge depends. In line with this principle, the use of the bridge is based upon the fact that when three of its arms are known the fourth can be calculated.

In Fig. 1 we have a diagram of the bridge, in which *a*, *b*, *c* and *d* represent resistance arms and letting *c* = the unknown resistance, we will get the following solution:

$$a : b :: c : d \text{ or } \frac{b \times c}{a \times d} \text{ or } c = \frac{ad.}{b}$$

New let us consider the measurement of resistance by the use of the voltmeter:

In Fig. 2, we use a key, 100 ohm shunt coil, battery with an output of 30 volts and a double scale 0 to 30 and 0 to 150 direct reading voltmeter. The test for resistance is made by the following formula:—

Let X = unknown resistance to be measured.
B = battery voltage.
D = deflection of voltmeter.
R = combined resistance of voltmeter and shunt.

Then $X = \frac{B - D}{D} \times R$.

For example, referring to Fig. 2, we will pull key lever to make contacts *a* and *b*, and we will get a reading of 15 volts; then pulling the key lever in the opposite direction, to make contacts *c* and *d* we get our battery voltage, which will vary from time to time. Now, we must calculate the combined resistance of the voltmeter and shunt. The rule for finding the combined resistances of two resistances in a divided circuit is the product of the two resistances divided by their sum. Then supposing the internal resistance of the voltmeter is 2,700 ohms when applying

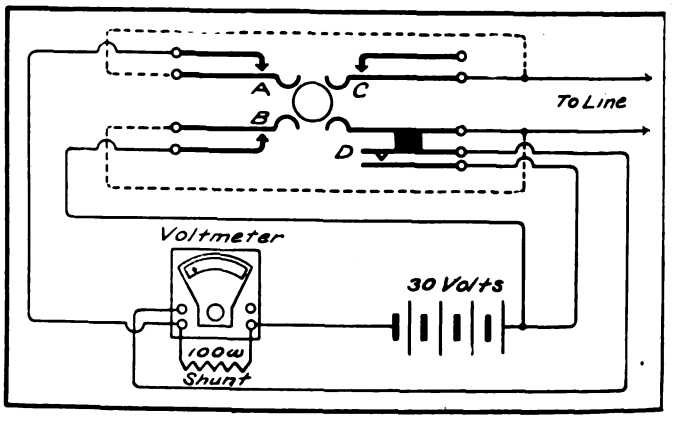

Fig. 2.

the rule, we will find that the combined resistance in this case is 96.4 ohms. Substituting the quantities we have:—

$$\frac{30 - 15}{15} \times 96.4 = 96.4 \text{ ohms.}$$

TELEPHONIC IMPROVEMENTS IN GREAT BRITAIN.

FOR a number of years the British telephone experts have placed great faith and confidence in the ring through principle; that is, the operator simply connects two parties together and the calling subscriber does his own signalling. To the American engineer this method of operating may appear antiquated, but from all accounts received, in a majority of instances, the service has been of a good character. Since the advent of central energy operation with the increased simplicity and rapidity of operating, it has been found advisable to adhere strictly to the American practice in respect to the control and supervision of connections. At the present time upwards of $3,000,000 is being spent in the United Kingdom for telephone extensions and improvements, and it can be confidently expected that within the next few years the telephone service of Great Britain will be as thorough and up to date as that of any other country in the world.

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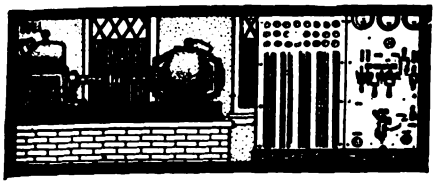

QUERIES

Questions on any subject relating to telephony will be answered on this page.

THE PARTY RINGING KEY.—(405.)

Enclosed is the sketch of a key I have; can it be used for two party ringing; if so, show connections? T. L.

The key you illustrate is adaptable for two party ringing, the connections being shown in Fig. 405. The wiring should be as shown; that is, the wires from the listening key, which is placed on the answering side of the key, connect with the inside springs on the *A* side and the calling circuit is connected to the middle springs on the *C* side.

One side of the generator should be grounded and connections made between it and the outside springs of the key, as

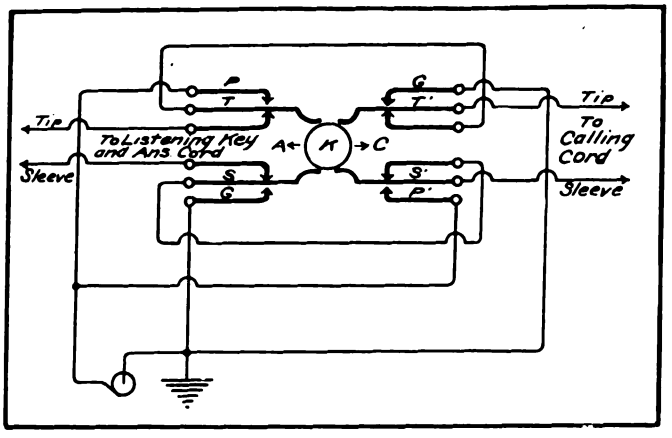

Fig. 405.

shown. Now, if the key is pulled in the direction of *C* it will cause the button *K* to move in the direction of *A*, causing the springs *T* and *S* to make contact with the ringing contacts *P* and *G*, respectively.

If the key is pulled in the direction of *A*, then the roller *C* causes the springs *T'* to make contact with *G'* and *S'* with *P'*.

By following out the circuits it will be seen that under the first condition the grounded side of the generator is connected with the sleeve side of the line and in the second condition it is the tip side that is grounded.

METALLIC CIRCUITS.—(406.)

We have several grounded circuits run with No. 14 copper wire. As the lines are very noisy and there is considerable cross talk, I suggested to the company to make all the circuits metallic. They say they can't stand the expense of new copper but are willing to get iron wire. What I would like to know is this: Would it be better to take down enough of the copper wire make one-half copper and then run iron for the remainder, or to let the copper wire stand and run the iron wire the entire length of the circuit? P. L.

We fully agree with your suggestion to your Company to make all of the circuits metallic. Past practice in telephony shows conclusively that first class service can only be secured by means of carefully designed and properly built metallic circuits.

It is to be regretted that the Company feel that they cannot afford a copper circuit and we believe that in the long run they will find it by far the cheapest policy. Copper wire is almost everlasting and requires but small annual maintenance expense. Iron, on the contrary, rusts rapidly, and even under the best circumstances the interest on the capital invested in the copper is much less than the annual depreciation of the iron wire line.

We would certainly not advise the removal of any of the copper wire which you now have up; on the contrary, if the Company will not approve of the necessary expense to make the lines copper metallic and are only willing to indulge in the penny wise and pound foolish plan of constructing them of iron, it would be better to allow what copper is in existence to remain and fill out the balance with iron. Making the circuits metallic with iron will undoubtedly give you better service, but with this expedient you cannot expect the lines to be as quiet as they would be with copper wire, for the reason that the magnetic qualities of iron wire are entirely different from copper and are more likely to contribute to the existence of cross talk.

PROTECTING POLES.—(407.)

We have several toll lines which run for considerable distances, one of them for 15 miles, another for 7 miles. Should the poles be equipped with lightning rods? If so, how often? Also, should the lines be fused? It is at present protected with heat coils and carbons. B. G.

Telephone companies almost universally adopt the practice of equipping the poles of aerial lines with lightning rods, while on the whole it has been found a wise precaution, the number of lightning rods to be put on, will depend somewhat upon the situation. In mountainous countries, where thunder storms are frequent, protection should be introduced more freely than in countries where lines are running over a level plane, and in a climate where thunder storms are of rare occurrence. In some countries it is considered best to have at least one lightning rod per mile, and where the exposure is great, it is wise to introduce three or four.

TYPES OF PINS.—(408.)

We would like you to furnish us the details of various pins used on telephone lines. N. Tel. Co.

There are both iron and wooden pins used in telephone construction. Of the latter there are three types each used for different purposes. These are illustrated in Fig. 408, together with dimensions. *A* is termed the line pin; *B*, the transposition pin, and is used when transpositions are to be made, and *C* is used for terminals. Iron pins vary slightly in design, but in general con-

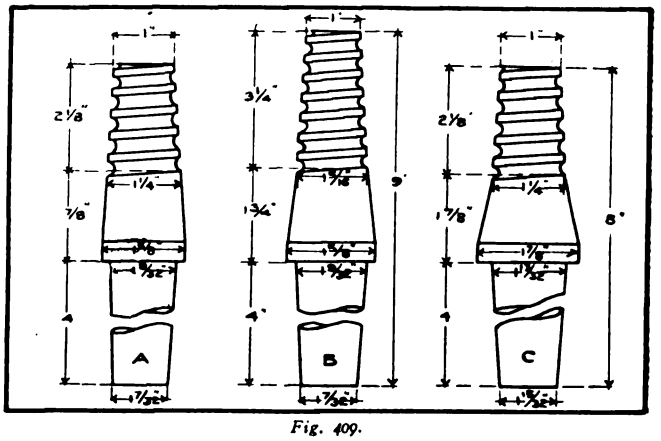

Fig. 409.

sist of an iron or steel bolt which has a wooden cap so made as to allow the insulator to be screwed on.

POWER TO RUN GENERATORS.—(409.)

Please let me know if there is any difference in the power necessary to run a pulsating electric generator and an ordinary direct current generator, both machines being exactly alike. The reason I ask is that it seems to me that the breaks and self induction either help or retard the power that turns the armature. F. H.

In answer to your query, we beg to advise that while theoretically there might be a slight difference in the amount of power consumed in a pulsating ringing current from that of the ordinary alternating current, it will not be noticeable in practice. While the shape of the wave has something to do with the power expended in the ordinary ringing generator, the friction and windage of the machine, together with the power required for the brushes, and the losses of the armature and field coils are so much greater than the amount of power required in the ringing current, as to entirely mask any difference due to shape of wave.

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The Editor's Page.

AN INDEPENDENT EXAMPLE.

THE history of telephony on the Pacific Coast is unique. Separated by the breadth of a continent from Boston and the baleful influence of the Bell, completely dominated by the brililant, though erratic Mr. Sabin, rich in population, richer in material wealth, and richest in a people who understand, appreciate and demand the telephone, the strip of territory from Seattle to the California Gulf, and from the coast to the Rockies, presents the most inviting of telephonic fields. For nearly two decades the Sunset Telephone Company possessed this, almost the most attractive telephonic territory in the United States. There were no signs of a rival. The Sabin-Hampton express system was, by its inventors, loudly declared to afford the quickest, best and cheapest service that could be given. The ten-party line and the nickel telephone, claimed by the indefatigable Mr. Sabin to be the only method of serving the small user, were born and bred in San Francisco. But the old story, told in the ancient past of the Jewish captivity, had to be repeated, and a few years ago the Independents wrote upon the Rocky Mountain wall the *"Mene mene tekel upharsin"* of the Pacific States Telephone Company, and now from Crescent City to San Diego the Independents are working.

Take as an illustration what has been done in Los Angeles. This is one of the most flourishing and interesting of Californian cities, having a population of approximately 125,000. For a number of years the Sunset Telephone Company telephoned this town, and with their best efforts, according to recent statistics, had secured approximately 12,000 instruments, or about one instrument to over 14 persons. A couple of years ago, or thereabouts, the Independent interests took hold. To-day they have a main office located at 246 South Hill street, to which extend 9,120 main lines, with 411 private branch exchange trunks, serving 14,301 telephones. There is also a branch office at Hollywood, where there are 132 lines in operation, and the office at Grand avenue opened August 1st with 2,000 lines, making a total of 11,252 lines, serving in round numbers 15,000 instruments. In connection with the branch offices there are 74 private branch exchanges, carrying from 10 to 250 lines each.

Over and above the subscribers actually in service the company has over 5,000 contracts now pending for which it has, as yet, been unable to secure the necessary substation apparatus. These subscribers, however, will be served as rapidly as the telephones can be obtained so that it is probable that within the next six months the Independent interests will serve upwards of 20,000 telephones. To-day the Independent instruments outnumber the Bell.

Of all the peoples in the United States the Californians are of the most loyal and open-hearted type. Excellent friends, they are equally good foes, and had the Sabin-Hampton express system, with all its frills and furbelows, furnished a service which was even remotely satisfactory; had its owners displayed but a moderate appreciation of the rights of the public; had they been in the least alive and responsive to the demands of California subscribers, and had they indicated a sincere endeavor to meet the requirements of their patrons, it would have been impossible for the Independents to make such a record. But statistics are stubborn, and it is now an incontrovertible fact that the Independents lead. What has been here accomplished is only an indication of what may be done in every California town.

THE QUICK ANSWER.

THERE is something said somewhere about the soft answer that turneth away wrath. In the telephone service it is the quick answer that prevents wrath. And prevention is a good deal better than turning away. There is nothing so exasperating to the average telephone user than a slow answer from the exchange—unless perhaps it be the total disappearance of the operator after having answered. On the other hand there is nothing so exhilarating to the subscriber than a uniformly quick answer. If he gets that he feels that there is something doing, that there is go and smartness about the service. It is a good thing to cultivate such a feeling among your subscribers. A subscriber who is accustomed to invariably prompt attention from "central" goes to the telephone with a confident feeling that he is going to be well done by.

It is worth much money to a telephone company to imbue its customers with a feeling of confidence that this will happen. Once the call has been answered the subscriber feels that business has started. It may take some time to get the second party on the line, but every user of the telephone service knows that the telephone company cannot drag people to the telephone; it can only ring the bells and trust to the general common-sense of the public for prompt attention to the call. The promptness of the answer to the original call, however, is absolutely under the control of the telephone company, and it is mainly by the promptness or slowness of this operation that the telephone-using public judges of the service. If the answer is uniformly quick the public finds the service good. If the answer is slow—sometimes quick, but generally slow—the public finds the service bad. And there is a good deal to be said for this point of view. We do not contend that a quick answer alone constitutes good service. Obviously there is a good deal more in the service than that. But if the plant is of such a nature and the general efficiency of the operating staff is so good that the answer is uniformly quick, the remaining operations are likely to be conducted with efficiency also. From the public view, however, the point is that with the operator's answer to the call the business of getting the connection really begins. Until the operator answers the subscriber is merely waiting on the doorstep, so to speak, and he knows that the operator is just the other side of the door. Consequently, although he is generous in his appreciation of promptness, he brooks delay with much impatience.

This being so, and it will not be disputed by any user of the telephone service that it is so, what measures must a telephone manager take to give his subscribers the quickest possible attention to their calls? He must have a good line plant, so that all signals effectively reach the exchange and false signals do not; he must have efficient signals and he must have a thoroughly well trained, efficient and smartly supervised operating force. A good line plant, let us hope, goes without saying nowaday. On the training and supervision of the operating staff too much stress cannot be laid. The operating staff can make or mar the service, or at any rate, they can make all the difference between a passably good service and one that is thoroughly smart and highly satisfactory to the subscribers. The wise manager will inform himself continuously of the quality of service supplied by making continuous tests of the service, so carried out that the actual service as experienced by the public is tested. In this way only can the manager be sure of what his customers are getting.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

THE TOWN'S ULTERIOR MOTIVE.

THE town of Owen Sound, Ontario, was given some sharp raps over the knuckles from Chief Justice Meredith in a judgment given in the suit of the Bell Telephone Company for an injunction to restrain the town from interfering with the laying of cables upon certain streets.

The town forbid the company laying a conduit across Poulett street to their new offices on the ground that the road could not be restored to its original condition. In regard to this objection his Lordship said:

"The road is but a macadamized one, and one that is often opened for far less generally useful purposes. Any objection to the work on this ground is purely a subterfuge to cover some ulterior purpose, and that purpose is plain, namely, to coerce the company to pay to the town a tax upon their business, which the town has no sort of legal right to demand. Their objection to the work is not made in good faith, but for a purpose *ultra vires* and wholly unwarranted.

"Parliament has clearly and distinctly given the plaintiffs power to carry their wires over or under public streets, but has made that right subject to certain rights. These latter rights must be exercised in good faith, and for a legitimate purpose, and should be reasonably exercised. Instead of that they have been unreasonably exercised in bad faith and for a purpose not authorized within the power of the defendants, so that whatever those rights may be the company is entitled to succeed in this action. The defendants will therefore be perpetually restrained from interfering with the work of the plaintiffs in carrying their wires to their new offices under, instead of over, the highway.

"Upon the broad question of the power of the municipal councils under the amended Federal Act, the extravagant claims of Owen Sound, that it rests with the town to determine as they see fit where and how the company shall construct their lines, seems to be quite unwarranted by the Act."

TELEPHONE LINES REAL PROPERTY IN ILLINOIS.

THE last General Assembly of Illinois passed a law making the property of telephone companies, particularly the lines and poles, real instead of personal property. Under the old law the property of telephone companies was considered personal; as such it could not be mortgaged to raise money. The only way money could be borrowed was by giving chattel mortgage which was good for only two years. This made money hard to get and the rate high. It is now possible for a railroad company to issue bonds, secured by real estate mortgage, and borrow money at a lower rate. Assessing officers and boards of review throughout the State are considering the question of raising assessments of telephone companies because of the change.

RIGHT TO CUT POOLROOMS OFF.

JUDGE SCOTT in the Supreme Court of New York has stated that he would not grant a mandatory injunction restraining the New York Telephone Company from interfering with the telephone service which it has contracted to give to the New York and New Jersey Distributing Company, known as the "Racing Syndicate." He said if any contract to furnish the service had been violated the remedy was an action for damages for the violation. "This court never issues mandatory injunctions if it can possibly avoid doing so," remarked Judge Scott, "and in this case you can bring an action to recover damages for any injuries you may have sustained." Counsel for the company, in opposing the motion, submitted affidavits of the police to show that the applicant company was supplying a poolroom with racing news, which brought forth the rejoinder from petitioner's solicitors that as the telephone company had not made any objection to sending out racing news for years, there was no reason why it should do so now.

Judge Scott, however, looked upon the change of view of the telephone company with some commendation, saying: "Even the late repentance of the telephone company is to be encouraged instead of discouraged. If it believes its property is being used for unlawful and immoral purposes the telephone company has the right to refuse to live up to its contracts. It is not the duty or right of any equity court to compel the company to do what it believes to be wrong."

CONSOLIDATION OF TELEPHONE COMPANIES.

IN an expropriation suit the Cumberland Telephone and Telegraph Company sought to acquire the right to erect and maintain its lines over the right of way of Morgan's Louisiana & Texas Railroad and Steampship Company. The court ordered a jury of freeholders to be drawn to assess the value of the right of way to be taken. On the day fixed for impaneling the jury, the defendant appeared and challenged the venire. The motion to quash was overruled and defendant filed an exception to the result and an answer. The trial resulting in a verdict for the plaintiff, the defendant appealed.

The principal objection of the defendant to the result was that the evidence did not show the alleged corporate capacity of the plaintiff company. The plaintiff corporation was formed as the result of the consolidation of three previously existing telephone companies. The legal existence of these companies was not questioned, but it was urged by defendant that, subsequent to their incorporation, the State of Kentucky adopted a new constitution containing the following provision: "No corporation in existence at the time of the adoption of this constitution shall have the benefit of future legislation without first filing in the office of the Secretary of State an acceptance of the provisions of this constitution; that in 1893 the legislature of Kentucky adopted a general law relating to private corporations and authorizing consolidations, but excluded from its benefits all corporations which had failed to comply with the requirements of the above section of the constitution; and that the evidence did not show that the constituent companies consolidated under the name of the plaintiff had complied with this condition precedent." The court held that when corporations assert rights dependent upon their legal existence, they must prove compliance with conditions precedent required by the organic law of their domicile. It therefore reversed the verdict and remanded the case for further proceedings, giving the plaintiff an opportunity to prove its compliance with the constitutional requirement in case it could do so.

Another objection of the defendant was that the jury was illegally drawn because the jurors were required to be freeholders. Upon this point the court held that the law requiring a jury of freeholders in expropriation cases, being a special statute enacted in a particular manner, was not affected by the general statute subsequently enacted, providing for the drawing of jurors for the trial of civil and criminal cases, the defendant having contended that the latter statute controlled the subject. Cumberland Teleph. & Teleg. Co. vs. Morgan's La. & T. R. & S. S. Co. (111 La., 36, S. 352).

MUST SHOW UP BOOKS.

SPECIAL JUDGE E. A. ELY, sitting in the circuit Court at Evansville, has decided that the Evansville Telephone Company must show its books, papers, subscription list, and all other matters pertaining to its affairs, to the attorney of the plaintiff in the suit of Edward Meyer against the company for the appointment of a receiver. Ten days were given the officers in which to comply with the court's request.

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IN THE OPERATING FIELD.

WHAT IS A PARTY LINE?

A PECULIARLY interesting case involving the judicial interpretation of just what is meant by a "party telephone line" has been brought in the Cuyahoga County, Ohio, courts by the filing of a request by the Cuyahoga Telephone Company and the Dime Savings and Banking Company for a court construction of the agreement between the bank and the telephone company.

The case grew out of a $3,500,000 bond transaction in which the bank, according to the agreement, gave the company a trust deed, and was to act as trustee of the bond transaction. That was in 1898, when the company was in need of funds for construction, and $2,000,000 was at once realized on the agreement for this purpose.

It was further provided that additional sums of money were to be paid over from time to time as the work of constructing and extending the system went on. The bank claims that according to the agreement desk telephones and party lines were to count only as single connections as showing the growth of the company's subscription list.

The Cuyahoga Company now claims that it has fulfilled the prescribed conditions so that it is now in a position to ask for a further installment of $125,000. It asserts that the connections in dispute are of such a nature as to fall within the terms of the agreement as to being separate connections.

The bank demurs to this claim of the company and the court is asked to decide just what was the scope of the term "party line" according to the agreement between the bank and company in 1899.

FLORIDA TELEPHONE DEVELOPMENT.

A MEETING of the directors of the Peninsular Telephone Company, of Tampa, Fla., was held recently at the office of the I. H. Ditwiler Company, Toledo, Ohio. A proposition for enlarging the system, which was discussed at a meeting there some time ago, was closed, and another proposition for the extension of toll lines and connecting with other systems was taken up.

Among the out-of-town directors attending the meeting were J. H. Goeke, S. A. Hoskins and W. G. Brorein, of Wapakoneta, Ohio. These gentlemen are also interested in several other telephone companies in Florida and Texas.

CITIZENS' COMPANY OF COLUMBUS INCREASES STOCK ISSUE.

THE Citizens' Telephone Company of Columbus, Ohio, has increased its capital stock from $750,000 to $1,250,000. The entire increase will be issued in preferred stock of 5,000 shares at $100 each. The holders of the preferred stock are to be entitled to receive a cumulative dividend at the rate of 6 per cent. per annum, payable semi-annually, out of the profits of the company, in preference to any dividend. The holders of this stock, in case of insolvency or dissolution, will be entitled to receive from the remaining assets, after the payment of liabilities, the full amount of the par value. The increased capital will be used for the extensive improvements that are being made and others that are contemplated.

TELEPHONE GIRLS' CONVENTION.

A CONVENTION of the telephone girls of the Consolidated Telephone Company was recently held in the offices of the company at Clarksburg, Va. The towns of Fairmont, Elkins, Belington, Philippi, Salem, Brown, Buckhannon, Weston and Clarksburg were represented, there being altogether twenty-six young ladies present. Fairmont was represented by Supt. J. Walter Barnes, Misses Elizabeth Kinkead, Edith Pickett and Nola Arnett.

At the morning session at 10:30 o'clock matters pertaining to the interests of the company were considered, different subjects were discussed of relative value to the service, and an opportunity was given for the operators to become better acquainted with one another. At the conclusion of the morning session the girls, escorted by Supt. J. Walter Barnes, went to the Waldo Hotel, where an elaborate dinner was served. All expenses of the convention, dinner, outing, etc., were defrayed by the telephone company.

In the afternoon the operators went to the park and had an outing. On their return in the evening another session was held and adjournment was made. The convention was in every way a success, and was quite enjoyable to all who attended.

TROLLEY ROAD ADOPTS TELEPHONE SYSTEM.

THE Cleveland, Painesville and Ashtabula Railway, an electric traction line running through Northeastern Ohio, has a telephone device that is new to that section of the country. At various points along the line miniature switchboards are fixed to the poles that support the trolley wires at such a height that they can easily be reached from the doors of the cars. Each car carries a portable telephone instrument. To call the dispatcher's office for orders it is only necessary for the cars to stop at one of the poles where the instrument can be plugged in, when the conductor is able to call up the dispatcher and talk without leaving the car. The system is said to be a great improvement over the old way of having the instrument attached to the pole some distance from the track.

NEW SWITCHBOARD FOR TIFFIN INDEPENDENT COMPANY.

THE Home Telephone Company of Tiffin, Ohio, is installing a modern lamp signal central energy switchboard with an installed capacity of 1200 and an ultimate capacity of 2,200. The rapidly increasing Independent telephone business in this locality has led to this valuable innovation.

It is confidently expected by the officers of the company that these and other improvements which are being made will make this exchange one of the most up-to-date in the Independent field. Every effort is being bent toward the early completion of the work as the number of new contracts awaiting service is increasing rapidly.

MEETING OF THE CITIZENS' TELEPHONE COMPANY.

THE report of Secretary Fisher of the Citizens' Telephone Company of Grand Rapids, Mich., shows a heavy increase in business for the last year. The net gain in telephones for the year was 2,357, and the Sparta exchange was annexed during the period and has become an important part of the system, which now controls 1,116 miles of wire for its toll system, 1,471 miles of copper metallic circuits, and 982 miles of iron metallic circuits, making a grand total of 2,453 miles of toll circuits with 4,906 miles of wire.

The number of city telephones in service is 5,605, the total Grand Rapids connections 328,168, an increase of 39,596 over the preceding year. The total amount of stock outstanding is $1,609,280.

It was announced that the company had purchased the telephone system at Allegan, which includes that city, Hopkins Station and

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Otsego, giving eighty-three miles of new toll lines. No additional improvements were recommended for the coming year.

The following officers were re-elected: President, Charles F. Rood; vice-president, Edward Fitzgerald; secretary, E. B. Fisher; treasurer, William J. Stuart; directors, Philip Graham, Robert D. Graham, C. E. Perkins, L. J. Rindge, E. G. Studley, J. B. Ware and Gaius W. Perkins; executive committee, President Charles F. Rood and Secretary E. B. Fisher *ex-officio* members; E. G. Studley, C. E. Perkis and R. D. Graham.

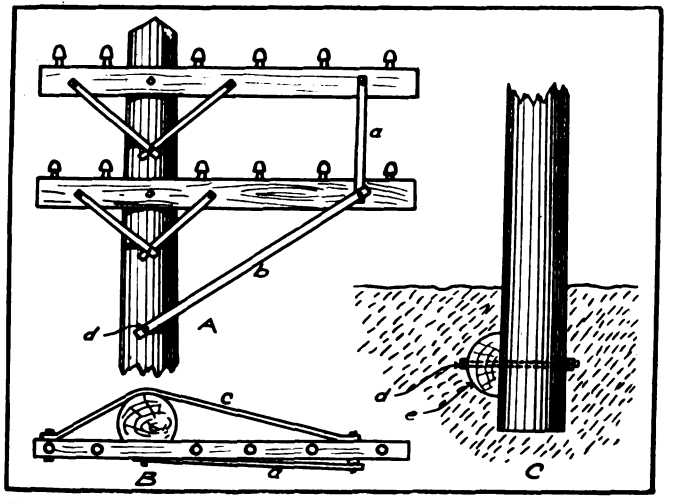
No change was made in the active management of the local exchange, the officers reappointing General Manager C. E. Tarte, Superintendent of Construction Albert Stacey and Superintendent of Equipment Edmund Land.

CONSTRUCTION STARTED ON SAN DIEGO INDEPENDENT SYSTEM.

THE Home Company of San Diego has started construction work on the new telephone system. Bids for the construction of an exchange building will be called for within a short time. Underground conduits are being laid in all the principal streets. Construction on pole lines for suburban connections are being done as fast as possible, so that when the exchange is ready for operation there may be as little delay as possible in making connections with subscribers.

SPECIAL CONSTRUCTION.

SPECIAL methods of construction are often necessary to overcome difficulties in line work. In the accompanying figure is illustrated the correct method of fastening cross-arms where the line wires are liable to interfere with trees. The method of bracing the cross-arms is shown in figures *A* and *B*,



If the work is carried out as shown, the cross-arms will be as secure as if they were spaced in the ordinary manner.

In Fig. *C* is shown the application of what is termed a *key*, which is often used in conjunction with the above method of placing cross-arms to prevent the pole being pulled over by the strain of the wires, and thus neutralizing the advantages which are sought to be gained.

NEWS FROM TORONTO.

AT a recent meeting of the Board of Control of Toronto it was decided that any Independent company which wished to secure a franchise must make an initial cash deposit with the city of $100,000. This is subject to reduction to $50,000, at the rate of $10,000 for every $100,000 expended in the installation of a plant, a final reduction to $25,000 to be allowed as soon as $1,000,000 has been expended on the plant. The $25,000 will remain on deposit at 4 per cent. interest, as a permanent guarantee that the contract will be carried out.

The Board decided to recommend that the contract be for a period of seven years instead of five years, thus allowing the company two years for the installation of enough of their plant to operate for 3,000 to 4,000 telephones. Provision is made for renewal of contract for five-year terms.

Another important condition is that which provides for the payment to the city of 5 per cent of the revenues of the company.

In the provision for the sale of the company's plant to the city, it is set forth that the company shall receive 10 per cent. additional to the valuation of arbitrators, if the company has been operating only five or seven years, but nothing additional shall be added if the franchise has obtained for longer than seven years.

TELEPHONES IN PERSIA.

THAT the rapid march of progress is not only Westward, but Eastward as well, is evident from the usage of the telephone in far off Persia.

Conditions in Oriental countries are often of such a nature as to permit the use of the telephone where the telegraph would not be considered. Asiatics generally are of a very secretive nature, consequently no amount of argument will convince them that the telegraphic message is considered secret. In the case of the telephone this is different, and consequently it is coming into great favor.

Teheran, the capital, and Ispahan, the largest cities in Persia, have telephone systems which are operated by a Belgian company, the apparatus being of either Russian or Belgian manufacture.

PRAISE FOR UTAH INDEPENDENT COMPANY.

A NUMBER of subscribers of the Utah Independent Telephone Company, of Salt Lake City, Utah, have been interviewed in reference to the efficiency of the service given them by this concern. They spoke in the highest terms of the new enterprise, and seemed highly pleased with the service rendered in comparison with the Bell Company.

THE CUMBERLAND AT PRINCETON, IND.

GENERAL dissatisfaction against the Cumberland Company at Princeton, Ind., has caused the city council to order the wires and poles of that company torn down unless it applies for a franchise. Since June 23d the company has been operating without one, and it is the general opinion that it intends to await the decision at Evansville before making an application. As it is apparent that it will be ousted from Evansville, which is the metropolis of southern Indiana and northern Kentucky, a Cumberland franchise would be almost worthless in any of the smaller cities.

The city of Princeton has also notified the Cumberland company that the franchise to do business in Princeton is worth $1,000 a year. Princeton has 8,000 inhabitants, and is now a rapidly growing city since the discovery of oil there in great quantities. It has an Independent telephone system with 220 miles of poles. The subscribers to the Independent company outnumber the Cumberland's list three to one. It is stated that if the Cumberland company refuses to pay $1,000 for the franchise that the Independent company there will make a contract with the city for that sum in return for an exclusive license.

NEW SUBSCRIBERS FOR CUYAHOGA.

THAT the citizens of Cleveland appreciate the new system installed by the Cuyahoga Company is evident from the fact that since the new switchboard has been in operation over 2,450 subscribers have been added to the list. This is an average of 21.35 per day, including Sundays. During the month of June the average of daily installation of new connections had increased to 24.64.

EXTENDING TOLL LINES IN OKLAHOMA.

A MEETING of the members of the Southwestern Telephone Association was recently held at Wichita, Kans., and ways and means were discussed for increasing the toll line systems of Oklahoma. The meeting was a quarterly gathering, and consisted of two sessions, one held during the morning and one in the afternoon. About fifty managers of Independent telephone lines in Oklahoma and Kansas were present.

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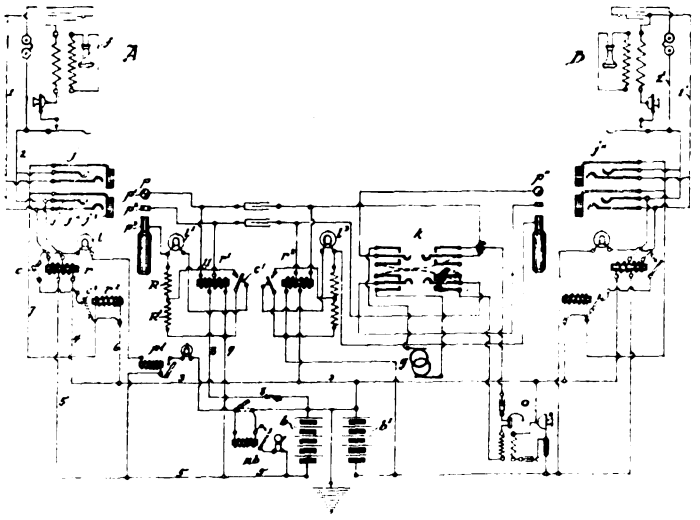
TELEPHONE PATENTS

TELEPHONE EXCHANGE SYSTEM.

J. P. Downs, of Cleveland, Ohio, patents (No. 765,822) and assigns, by mesne assignment, to John F. McDonnell, of Cleveland, Ohio, a telephone exchange system. This invention relates to improvements in common battery telephone exchange circuits. The objects are to reduce or obviate the objectionable click in the receivers, to render the system more economical by reducing current consumption, to make the relays more positive in action and to balance the circuits more accurately. The results are obtained by maintaining a closed battery circuit when the same is once established through the subscriber's set, and by shunting into the circuit the additional relays and other pieces of apparatus, and by opening, instead of shunting, the supervisory signal circuits. The circuit is shown in the accompanying illustration. When the subscriber removes his receiver the circuit is closed from positive side of battery through conductors *3*, *4*, one-half of the



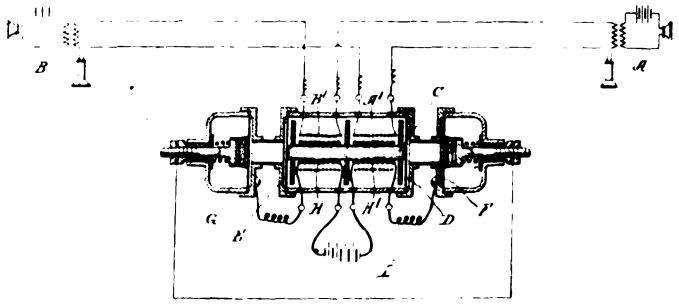
relay *r*, conductor *2*, through substation conductor *1*, other half of relay *r*, conductor *5* to positive poles of battery. The line relay is energized, closing the lamp circuit at *c*. The circuit through the supervisory *r'* controlling the lamp *l'* will be closed through tip and sleeve *p' p2* by contact with springs *j1 j2*, the relay is excited and opens the normally closed lamp circuit at *c'*, thereby extinguishing the supervisory lamp *l'*. Current flows from positive pole of battery *b* over conductor *8* to half of relay *r'*, tip of plug, substation instrument, conductor *1*, sleeve *p2* and other half of relay, conductors *9* and *5*, to positive pole of battery. Lamp relay *r2* is energized, opens circuit of signal lamp *l* at contact *c2*. Circuit being from positive pole of battery *b*, conductors *3* and *6*, through winding of relay *r2*, conductor *7*, test ring resistance *R* and parallel with *R'*, conductor *11*, conductors *9* and *5* to negative pole. The rest of the circuit can be easily traced.

IMPROVED TELEPHONE DIRECTORY.

F. Drowns, of Malden, Mass., patents (No. 763,093) an improved telephone directory This device consists in placing underneath the rubber mouthpiece fastened to a transmitter a circular paper disc upon which the names of the frequent subscribers are printed, thus forming a proper directory.

TELEPHONE REPEATER

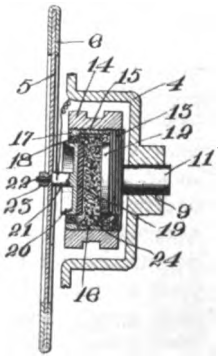
D. H. Wilson, of Chicago, Ill., patents (No. 766,155) and assigns to George W. Kretzinger, of Chicago, Ill., a telephone repeater. The object of this invention is to provide a telephone repeater which is arranged as shown in the accompanying illustration, in which there is a core, *C*, upon which is wound a coil, *A'* and a coil *B'*, these coils being connected in the main line which connects the instruments *A* and *B*. The line is continuous from one set of instruments to the other, and one of the coils is in one branch of the line and the other in the other branch. The telephone receivers *D* and *E* are associated with the core *C* that



forms the controlling magnets for the receiver diaphragms. Opposite to the receivers are the transmitters F and G, arranged to receive the sound waves from the receivers. A primary coil is wound upon the core *C* and connected to the transmitters *F* and *G* and is made of two sections *H* and *H'*, the battery being connected between the two sections. Thus messages can be transmitted in both directions over the same line. When station *A* is being used current passes through coils *A'* and *B'* energizing core *C* and causing the receivers to be operated. They act upon the transmitters and vary the current through the sections *H* and *H'*, which induces the current in *A'* and *B'*. Receivers *D* and *E* work simultaneously when both are used, also the transmitters *F* and *G*. It will be seen by this construction that the talking current is reinforced by means of the repeater.

TELEPHONE TRANSMITTER.

D. C. Jackson, of Madison, Wis., patents (No. 764,055), a telephone transmitter. This invention relates to improvements in microphonic transmitters and is illustrated in the accompanying figure. The inventor provides a threaded collar *14* into which the electrode *13* is screwed. This is the rear electrode, and is supported by the bridge *4*. The front electrode *19* is attached to



the plunger *20*, which is fastened to the diaphragm. This plunger is surrounded by a fibrous packing *18* which prevents the granules which are retained between the two electrodes from escaping from the chamber which is formed by the two electrodes and the collar *14*.

SELECTIVE SIGNALLING SYSTEM.

William M. Davis, Chicago, Ill. Patent No. 766,224. Assigned to Stromberg-Carlson Telephone Mfg. Co. An Improved Selective Signalling System.

We have recently had occasion to notice a patent granted to Mr. Davis for selective signalling system based upon providing at the central office various kinds of current, such as alternating current of various frequencies, and direct pulsating current, positive and negative.

The patent now under consideration is an extension and addi-

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tion to the former patents, and relates entirely to the method of arranging the sub-stations so that they shall be responsive to the various kinds of currents. Mr. Davis secures this result by "ringing ground and talking metallic," and by placing the stations either on one side or the other of the line, and by supplying them with various combinations of condensers and inductance coils, so that the different stations shall be receiving a different kind of current.

TELEPHONE SYSTEM.

William M. Davis, Chicago, Ill., patents (No. 766,223) and assigns to the Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., an improved telephone system.

This invention is shown in the accompanying illustration. At the sub-station the inventor provides an induction coil, whose windings, *3* and *4*, are placed in series with the transmitter *2*, while the receiver *1* is arranged as shunt around the winding *4*. There is the usual ringer *6* and condenser, the hook switch *5*

Fig 2.

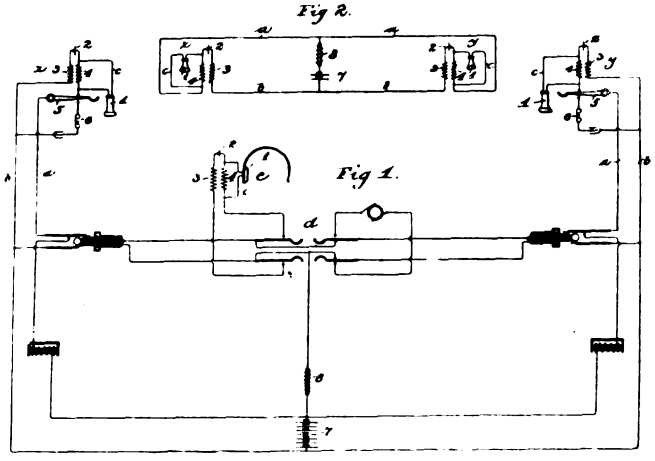

Fig 1.

being arranged to close the ringing circuit when in its lower position and open it when the receiver is removed, while the talking circuit is thus closed. A common battery, *7*, is provided with a retardation coil, *8*, as shown. The inventor claims that by this arrangement of the receiver, transmitter and windings of the induction coil, which are respectively equal in resistance, improved transmission is obtained.

TELEPHONE BOX.

Charles C. Hughes, Baltimore, Md., patents (No. 766,354) an improved telephone box.

The object of this invention is to provide an improved mechanism in which the sub-station apparatus may be enclosed. The inventor assembles the apparatus, such as the hook switch, transmitter, etc., upon the cover of a box. The box has no bottom but is secured to the wall, and inside thereof the circuits are brought in and terminated. The cover and the box are provided with knife switches so arranged as to operate both to close the circuits and to secure the cover to the box.

SERVICE-METER FOR TELEPHONE EXCHANGES.

James L. McQuarrie, South Orange, N. J., patents (No. 766,375) and assigns to Western Electric Company, of Chicago, Ill., an improved telephone service meter.

The object of this invention is to provide a service meter so arranged that the subscriber can contract for a certain predetermined number of messages, which the meter will automatically record, and that after the pre-arranged number has been exhausted the meter will register the excess number of messages and notify the central offices thereof. This invention is shown in Figs. 1, 4 and 5, in which Fig. 1 is a front elevation, Fig. 4 a section, and Fig. 5 the switchboard circuit. In Figs. 1 and 4 there is a counting train, *a*, which is operated step by step by a pawl-and-ratchet mechanism actuated by manual push button, *b*. In connection therewith is a gear-train, which is advanced step by step as the counting train is moved. The push-button *b* operates the lever *b'*, carrying the pawls b^2 b^3 that operate the counting and gear train. The lever *b'* is held normally in a retracted position by spring *c*. The ratchet wheel *d* of the gear-train is actuated by the pawl b^3 and carries a pinion, *d'* which meshes with the large gear wheel *e*. As the counting train is advanced step by step the gear train is rotated.

An insulating stud, *f*, carried upon gear wheel *e* engages contact spring *g* and separates it from the contact-anvil *g'*, when the gear wheel reaches a predetermined point in its rotation. A pair of contact springs, *h h'*, are normally closed by an insulating stud, *k*, carried upon the lever *b'*. When the push-button *b* is operated the stud *k* is moved and spring *h* raised by its own elasticity. A gong, *1*, is provided, having a tapper, *1'*, actuated by the ratchet wheel *d*, so that each time the button *b* is pressed the counting train is advanced *1* step and the gong *1* is struck. The central office circuit has no peculiarities.

The subscriber manually operates his service-meter and records each call by the push-button. When the service meter is actu-

Fig 5.

Fig 1.

Fig 4.

ated gong *1* is sounded and can be heard at the central office, so the operator knows from hearing the gong that registration has been duly made. When button of service meter is pressed both shunts *6* and *7* open and buzzer *m* is included in the circuit. After the full terminal number of calls have been made the stud *f* is advanced till it engages spring *g* and opens shunt *6*. The buzzer is then transversed by current, and so transmits a signal which will be heard by both the operator and subscriber. This signal indicates that further service will be in excess of predetermined number of calls.

TELEPHONE APPARATUS.

Christian Hülsmeyer, Düsseldorf, Germany, patents (No. 766,355) an improved telephonogram apparatus.

The object of this patent is to produce an improved apparatus for the transmission of signals by means of a beam of light. The essence of the invention consists in providing a mirror, which is mounted upon the armature of an electro-magnet, so that the mirror shall oscillate with any change in the magnetic field, said changes being produced by a sound as in a telephone receiver. In the path of the beam of light a slit or aperture is provided in an opaque plate, so that as the beam vibrates more or less rays will pass through the slit, depending upon the position of the mirror. At the receiving station any form of device which is sensitive to light, such as a selenium cell, may be employed as a receiver.

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THE WEEK'S MESSAGES

FINANCIAL.

BIRMINGHAM, ALA.—A special meeting of the People's Home Telephone Company has been called for September 1st for the purpose of voting on a proposition to cancel the present authorized issue of bonds of $100,000 and to authorize instead an issue of $200,000 first mortgage 5 per cent. 20 year gold bonds to be secured by trust deed of all the company's property and franchises. The proceeds of this issue of bonds will be used to pay off the present indebtedness of the company and provide funds for future extensions of their plans.

CHICAGO, ILL.—The Runzel Lenz Electric Manufacturing Company has been organized to manufacture switchboard cables and telephone and switchboard cords.

JACKSONVILLE, ILL.—The Illinois Telephone Company has increased its capitalization from $100,000 to $500,000.

PALO, MICH.—The Palo Telephone Company has increased its capital stock from $6,000 to $10,000. The new money will be used in extending rural lines.

CLEVELAND, OHIO.—The better feeling toward Independent telephone securities on the Cleveland stock market was noted last week. It is said that this is more marked at present than for a long time.

ELECTIONS.

SAVANNAH, GA.—At the recent annual meeting of the stockholders of the Georgia Telephone & Telegraph Company, officers were elected as follows: President and general manager, W. A. Bisbee; vice-president, J. H. Estill; treasurer, C. S. Kenyon; secretary, W. V. Davis.

FRANCHISES.

TORONTO, CANADA.—Tenders for a telephone franchise will be received on or before October 1st.

CARRABEIL, FLA.—Mr. W. C. Lewis, of the First National Bank of Tallahassee, and Dr. Moore, of Tallahassee, have been granted a franchise by the local city council to construct a local system with long distance connection with Thomasville, Georgia, and Tallahassee.

SO. McALESTER, IND, TER.—The Schooler Brothers have been granted a franchise to operate a common battery telephone system in this city, in competition with the old telephone system.

EDWARDSVILLE, ILL.—E. W. Burroughs, Albert Miller, George C. Stullken and others have petitioned the supervisors of Madison County for franchise over the public highways of the county.

PARKER, KANS.—The Parker Telephone Company has been granted a franchise and will install a local telephone exchange. It is capitalized at $2,000.

PRESQUE ISLE, ME.—The Farmers' Telephone Company, of Robinson, has been granted a franchise by the selectmen.

SKOWHEGAN, ME.—The Somerset Farmers Co-operative Telephone Company and the Central Main Telephone Company have both petitioned the selectmen for local franchises. The Farmer Company is an Independent line and the latter company has the direct backing of the Bell Telephone Company. It was organized on account of the success of the Farmers' Company. It is thought that the Independent company will be granted the franchise.

WILLMAR, MINN.—The Tri-State Telephone Company was granted the right to run a line through town and install a pay station.

OMAHA, NEB.—The city council had decided to defer consideration of the matter of granting a franchise to an Independent telephone company for two weeks.

HIGHSTOWN, N. J.—The Farmers' Telephone Company has applied to the city council for a franchise.

GRANDVILLE, N. Y.—The Grandville Telephone Company has declared a semi-annual dividend of 3 per cent, the balance of the earnings were added to the surplus account. Two hundred and sixty new telephones have been installed in the past year. The old officers and directors were re-elected.

OWEGO, N. Y.—The York State Telegraph Company is endeavoring to establish an exchange here by means of the franchise granted the Binghamton Telephone Company to stretch a wire or cable through such street or streets as the village may allow and under the supervision of the trustees.

FARGO, N. D.—The Tri-State Telegraph & Telephone Company has petitioned the village of Fargo for a franchise giving it the right to build its lines through the village.

COLUMBUS, OHIO.—The Citizens' Telephone Company has increased its capital stock from $750,000 to $1,250,000.

EASTON, PA.—The Easton & Bethlehem Telephone Construction Company has petitioned the borough council of Fountain Hill for a franchise.

BONHAM, TEX.—The city council has granted a franchise to the Phenix Telephone & Telegraph Company. Twenty-five or thirty telephones will be installed at once.

COMBINATIONS.

WINSLOW, ILL.—The Freeport Telephone Company's plant in Winslow has been purchased by Crosby & Blaisdell, who will connect it with their extensive system.

HERON, ILL.—The Farmers' New Era Telephone Company recently organized, has purchased from the Citizens' Telephone Company the line in Alden and Hebron Townships and the north of Greenwood Township. The exchange will be installed at Hebron. Geo. Hunt is president of the company.

LOSANTVILLE, IND.—The Parker City Telephone Company has purchased the local telephone plant from A. L. Cox for $1,200.

PETERSBURG, IND.—P. K. Heuring has sold his interest in the Independent telephone company to C. H. Webb.

SLAYTON, MINN.—Geo. H. Woodgate, of Slayton, has purchased a telephone line running from this place to Cameron Township from F. F. Robinson. Mr. Woodgate intends to connect the line with Hadley and Slayton.

MORRISTOWN, TENN.—The property and franchise of the Citizens' Telephone Company, of Morristown, will be sold on September 12th under a deed of trust to secure J. W. Fisher a note for $7,000.

LA CROSSE, WIS.—The La Crosse Interurban Telephone Company has purchased the Barre Telephone Company's plant.

PERSONAL.

MR. BROWN, electrical engineer, of Indianapolis, Ind., has charge of the work of installing the new switchboard of the Home Telephone Company in Tiffin, Ohio.

EDWARD ERB has been appointed manager of the Wisconsin Telephone Company's exchange at Racine.

J. W. GLASS has been appointed superintendent of construction for the Pacific States Telephone Company, at Oakland, Cal.

MR. E. M. JENKINS has been appointed manager of the Wabash Telephone exchange at Vincennes, Ind.

GREGORY McINERY has been appointed manager of the Central Union exchange at Savanna, Ill.

J. W. SMITH has been appointed manager of the telephone plant of the Union Electric Company, at Moline, Iowa.

W. B. THOMPSON has been appointed manager of the Home Telephone Company at Hamilton, O.

NEW COMPANY NOTES.

BELVIDERE, ILL.—The Boone County Telephone Company has been incorporated with a capital stock of $2,500. The incorporators are F. W. Plane, I. W. Barningham and S. Hicks.

FARMINGTON, ILL.—The Farmington Telephone Company has been incorporated with a capital stock of $1,000. The incorporators are: J. W. Connelly, F. S. Vandesloot and A. H. Fash.

OCOYA, ILL.—The Eppard's Point Telephone Company has been incorporated with a capital stock of $2,500, by W. E. Fisk, W. W. Osborn, W. Wagner.

ST. JOSEPH, ILL.—J. J. Woodin, of Louisiana, is in St. Joseph arranging for the installation of a telephone system. The St. Joseph Telephone Company has been organized and will be incorporated. It is backed by prominent residents of this town.

IDAVILLE, IND.—The Idaville Co-operative Telephone Company has been incorporated to give telephone service in this vicinity. The officers of the company are W. Pearson, Delphi, president; T. B. Grime, Idaville, vice-president; J. Reff, Idaville, treasurer; L. Read, Idaville, secretary; F. Roger, Idaville, manager.

CYPRESS, IND.—The Cypress Independent Telephone Company has filed articles of incorporation with the county recorder. The capital stock is $8,000. The directors are: John F. Edmund, president; John A. Neal, secretary and treasurer; Edgar S. Levy and L. B. Sinkle.

MANNING, IA.—The Manning Telephone Company has been incorporated with a capital stock of $2,500, by W. B. Swaney and others.

LAWRENCE, KANS.—The Lawrence Home Telephone Company has been incorporated with a capital stock of $125,000.

HENDERSON, MINN.—The Henderson Telephone Company has been incorporated with a capital stock of $10,000, by Hans Ems, W. H. Leeman, Lionel A. Guilbert, John F. Dempsey, Phil. J. Hemler, Allois W. Heberle, August Ney, Alfred C. Blasing and William N. Theissen.

ST. PAUL, MINN.—The United States Railway Signal & Telephone Company has been incorporated with a capital stock of $1,000,000. It will manufacture the Johnson-Ballard electric signals. The incorporators are: James A. Ballard, Horatio A. Johnson, and Angelo H. Sprague.

KEARNEY, NEB.—The Kearney Telephone Construction Company has been incorporated with a capital stock of $100,000.

HENNIKER, N. H.—The Henniker Telephone Company has been incorporated with a capital stock of $40,000.

COLUMBUS, OHIO.—The Franklin County Telephone Company has been incorporated with a capital stock of $150,000. The incorporators are: Isaac B. Cameron, Seth L. Rose, Charles F. Johnson and Ralph Reamer.

TURIN, OHIO.—The Hahne Telephone Company has been incorporated. It will have headquarters in Turin.

BEMD, ORE.—The Deschutes Telephone Company, of Bemd, has been incorporated with a capital stock of $3,000 by P. L. Tompkins, George C. Steineman and W. E. Guerin, Jr.

JUNCTION CITY, TEX.—The Junction City Telephone Company has been incorporated with a capital stock of $5,000, by T. B. Phillips, M. E. Blackburn and T. J. Bailey.

CAMBRIA, WIS.—The Cambria Co-operative Telephone Company has been incorporated with a capital stock of $1,000, by H. W. Thomas, C. Hecker and E. D. Lord.

HUDSON, WIS.—The Hudson Prairie Telephone Company has been incorporated with a capital stock of $3,000, by George Turner, Arthur McDiamid and G. E. Holden.

MISCELLANEOUS.

POINT ATKINSON, B. C.—It is reported that a telephone line will be built from here to Vancouver.

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WASHINGTON, D. C.—The cabinet at a meeting this week discussed the advisability of the Government installing its own telephone system in Washington. The local Bell Telephone Company is preparing to raise its rates and several of the cabinet officers called attention to the company's demands. The cabinet finally placed the matter in Secretary Morton's hands for investigation. Some of the officers thought it would be cheaper for the Government to construct and operate the inter-department telephone system.

ORLEANS, IND.—The Hoosier Telephone Company has installed a new switchboard.

PORTLAND, IND.—The Bryant Telephone Company has severed connections with the Bell Company and secured toll connections with the United Telephone Company.

PRINCETON, IND.—The Independent exchange at Princeton, Ind., is quarantined on account of a case of smallpox which developed while one of the operators was in the office. The remaining girls, six in number, will be compelled to stay in the building for ten days. Arrangements have been made for sleeping and eating quarters in the rest room of the building.

CITY OF MEXICO, MEX.—James Menzies, of Boston, is completing arrangements for a telephone system here.

HART, MICH.—Since the first of May over 100 new telephones have been added to the Hart exchange of the Lake Shore Telephone Company. Fully half of the newly installed telephones are in farm houses.

SARANAC, MICH.—The Saranac Telephone & Improvement Company has decided to construct lines out of the village. The first line will run north, and work will be commenced as soon as enough contracts can be secured.

BENBORO, MO.—W. A. Clow has completed a new telephone line from here to Ewing. The line has ten subscribers and is thirteen miles long.

KANSAS CITY, MO.—The Home Telephone Company has petitioned the county court to put its telephones in the county offices.

MEXICO, MO.—The Union Telephone Company has installed a new switchboard here. This company now owns exchanges at Laddonia, Rush Hill, Benton City, Worcester and Mexico.

MILTON, MO.—The Milton Telephone Company has installed a new switchboard recently. The capacity now is 300 lines, not including the country lines.

RICHMOND, MO.—The Richmond Telephone exchange has recently been connected to Kansas City. The Home Telephone Company furnished the capital.

NEW LONDON, MINN.—The New London Central Telephone Company has completed its system. A hundred line switchboard has been installed with Stromberg-Carlson instruments.

LINCOLN, NEB.—The Automatic Telephone Company is making large additions to the number of its subscribers by means of well placed newspaper advertising.

ALLIANCE, OHIO.—The Starke County Telephone Company suffered a loss of about $7,000 by the partial destruction of its switchboards through fire. The origin of the fire is not definitely known but is thought to have been caused by the contact with high tension circuits.

PITTSBURG, PA.—The Pittsburg & Allegheny Telephone Company has recently received a shipment of over 200 pole cable terminals and 100 more are ready for shipment. The company is using some of these terminals for its McKeesport exchange, the balance being for some of its other exchanges.

YANKTON, S. D.—At the meeting of the county commissioners a resolution was adopted giving the Independent Telephone Company, of Yankton, permission to use the roadways through the county for the purpose of setting poles for a long distance telephone line. The president of the company is E. A. Bruce, and J. J. Wagner is secretary.

BRIDGEPORT, W. VA.—The Belmont Telephone Company is arranging to secure toll connections with all points in Ohio.

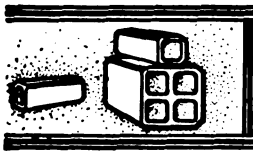
RACINE, WIS.—The Citizens' Telephone Company now has over 2,000 telephones in operation.

UNDERGROUND.

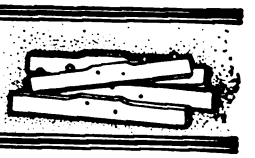
LEAVENWORTH, KANS.—The city council has granted a new franchise to the People's Telephone Company for twelve years. The company agrees to place its wires underground in the business portion of the city and to make improvements amounting to about $30,000.

MOUNT CLEMENS, MICH.—The local telephone company is placing its wires underground.

DOYLESTOWN, PA.—The Delaware & Atlantic Telephone Company will install underground conduit system in Doylestown.



New Construction in the Field



LOS ANGELES, CAL.—The Home Telephone Company is building a line from Pasadena that will connect with the Home system at Glendale.

RIVERSIDE, CAL.—Work will be started on the new Independent exchange about September 15th.

SINCLAIR, ILL.—The Lighter-Arcadia Telephone Company is constructing another line from Sinclair to Yatesville.

QUINCY, ILL.—The Adams Pike County and Hannibal Telephone Company has been incorporated with a capital stock of $7,000, by Wm. H. Breckenridge, John W. Buttz, Samuel S. Inman and Charles H. Rankin.

VIRDEN, ILL.—The Kinloch Telephone Company is erecting a telephone line in this town.

IONIA, IA.—The Interstate Telephone Company will construct a line from this place to Nashua.

MOLINE, IA.—The Union Electric Co. is planning a number of extensions and improvements to the telephone system.

SPENCER, IA.—The Spencer Telephone Company has commenced work on its system.

WAVERLY, IA.—J. W. Bangs, of Cedar Falls, and C. H. Varrows are canvassing for subscribers and making arrangements for the construction of several rural lines in this vicinity. Very advantageous terms have been made for the connection with the U. S. Telephone Company's central office in this city.

BOWLING GREEN, KY.—The Home Telephone Company is building a line to Smith's Grove.

CORTLAND, ME.—The Northeastern Telephone Company has arranged to install an exchange at Windham.

GRAND RAPIDS, MICH.—The city has authorized General Superintendent Meyer of the Board of Public Works to prepare plans and estimates of the cost of installing a telephone exchange for the use of the department.

OCEANA, MICH.—The Lake Shore Telephone Company will install an exchange at Pentwater.

BENSON, MINN.—The Tri-State Telephone Company has completed the line to this point which is to run from St. Paul to Grand Forks.

FAIRMONT, MINN.—A telephone line is to be constructed by the farmers east of this place.

FRANKLIN, MINN.—A local telephone company is building a line south on Lone Tree.

GLENCOE, MINN.—The Norwood-Young America Telephone Company is making a number of extensions, including a line to Coney Island.

BOVINA, MO.—The Mutual Telephone Company, of this place, by a meeting held recently, decided to purchase a new switchboard, to be installed at once.

ST. JOSEPH, MO.—The Seneca Telephone Company is reconstructing its pole line here.

BIG TIMBER, MONT.—The Northern Telephone Company is extending its system to take in all the ranch country north of the Yellowstone Park.

CHAPMAN, NEB.—The Independent Chapman Telephone Association is preparing to construct lines to Archer and Prairie Creek. Lines are contemplated to other parts of the country to connect with other Independent systems.

ST. JOHN, N. B., CANADA.—The New Brunswick Telephone Company is constructing a line from Grand Falls to Edmunston and one from St. John to Fredericton. A new line will probably be constructed from Fredericton to Chatham.

LAWTON, N. D.—Lawton citizens intend to put in a telephone exchange.

ELMIRA, N. Y.—The York State Telephone Company is building a line from here to Binghamton by way of Spencer, Owego and Union.

DARIEN, N. Y.—The Darien Telephone Company has connected the Corfu Exchange with East Pembroke. Two other lines to Darien, and a third to Alexander are contemplated.

MARION, N. Y.—The Wayne-Monroe Telephone Company has secured thirty contracts in this village and will establish a local exchange.

PINGREE, N. D.—Buchanan Brothers are building a telephone line from Jamestown to Buchanan.

ADAMSVILLE, OHIO.—The work of completing connections between here and Janesville by the United States Long Distance Company is nearly finished.

HAMILTON, OHIO.—Manager Thompson, of the Hamilton Home Telephone Company, announces that the company will entirely rebuild the Scipio line in the near future. This line was purchased from the Scipio Telephone Company.

OXFORD, OHIO.—The Oxford Telephone Company has contracted with the Miami University to install a private branch exchange with twenty-two telephones and two trunk lines connecting with the Oxford exchange.

TOLEDO, OHIO.—A meeting of the directors of the Peninsular Telephone Company, of Tampa, Florida, was held recently at the office of the I. H. Detwiler Company. A proposition for enlarging the system was closed and another proposition for the extension of toll lines in connection with other systems was taken up.

DUSHORE, PA.—The Sullivan & Wyoming Telephone Line and the Sullivan County Telephone Line have agreed to establish a union exchange at Dushore.

INDIANA, PA.—At a meeting of the Farmers Telephone Company it was decided to string a line from Indiana to Plumville and Punxsutawney, Lines between Penn Run and Indiana, Uniontown ad Cookport, Coolspring and Knoxdale and Cookport and Douglas became members of the company. The company's system now embraces about 800 miles of lines in Indiana, Jefferson and Armstrong Counties. Several new lines are in course of construction.

READING, PA.—The Conestoga Telephone Company has completed its line to Birdsboro by way of Morgantown, White Bear, Churchtown, Geigertown, Joanna and Elverson.

PHILADELPHIA, PA.—The Pennsylvania Railroad will use the telephone in its block signal system on the new West Philadelphia line instead of the telegraph.

PHILIPSBURG, PA.—The Huntington and Clearfield Telephone Company has built a line from Peale to Snow Shoe to connect with the lines of the United Telephone and Telegraph Company.

LAKE PRESTON, S. D.—A new rural telephone line is being constructed from this place north and west of town. It is said another line will be built to the farming community west and south.

BRYAN, TEX.—Stephen Moss, J. O. Tucker, and E. E. Wilson are constructing a new line from Bryan to connect with Wheelock, Henry Prairie, and other towns. It will connect with the Franklin line.

EDGE, TEX.—The stockholders of the local telephone company are preparing to improve the line which extends from Edge to Bryan, a distance of eighteen miles.

LOCHHART, TEX.—The Commercial Telephone Company has arranged to install a telephone system in this city.

MACY, TEX.—Marvin Hunt, of this place is rebuilding his local telephone line.

MONTPELIER, VT.—A meeting of the Montpelier Telephone Company was held recently and plans were discussed for the construction of a line. The poles have been set for some time, but the wires have never been strung. It is thought now that the work will be pushed forward to completion.

WINCHESTER, VA.—T. H. Nevitt, of Harrisburg, Pennsylvania, chief engineer of the United Telephone & Telegraph Company, is here making final arrangements preparatory to erecting an entire new plant in this city. A new switchboard will be installed and all wires run in cables.

WHEELING, W. VA.—The Belmont and National Telephone Companies will extend their lines to Galord. Quite a large number of subscribers have been secured along the line.

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TRADE NOTES

THE F. BISSELL COMPANY, of Toledo, Ohio, has published a new and complete bulletin on wire that is up to date in every respect. This bulletin will be mailed to any telephone company upon request.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Chicago, Ill., reports that times have never been better for this season of the year, and it is with difficulty that it is able to keep up with orders.

JULIUS ANDRAE AND SONS COMPANY, of Milwaukee, Wis., has recently issued a new catalogue. This catalogue is up to date in every respect and includes descriptions of all the apparatus, tools and material this company has for sale. To all parties interested this catalogue will be mailed free upon request.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, of Chicago, has received an order from the corporation officers of the town of Neepawa, Canada, for a complete new telephone exchange equipment and all necessary appurtenances, construction material, cables, etc., to completely re-eqiup and rebuild the local system.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY, of Meriden, Conn., report very large sales on their automatic intercommunicating telephone, which is now fitted for branch office exchanges with connection to city service and is adapted either for connection to local or common battery systems. The company has issued a bulletin describing this instrument which will be sent on request.

W. N. MATTHEWS AND BRO., 619 Carleton Building, St. Louis, are the distributing agents for the Stombaugh guy anchor. To interest the people at large who have any use for guy anchors, this firm has been distributing some remarkably good advertising matter in the shape of folders. The latest is entitled "Unkel Sam's Publicity Buro," by Mr. National Reputation. The phraseology is typical ot the backwoods farmer but the strength of the argument is as strong as the anchor which Mr. Reputation says "kum putty near pullin' Ithaca frum off'n the map ov Nu York." Those interested should send for the folder and find out how this happened.

THE T. AND A. SELECTIVE CALL COMPANY, of Geneseo, Ill., has recently placed on the market a selective call system which possesses some unique features. The apparatus is so designed that when attached to an ordinary generator pulsating as well as alternating current can be secured. By means of a specially designed relay at the exchange a subscriber can signal any party on a party line without calling the operator, or call the operator without signaling any of the subscribers. In tests made over lines of the Kewanee Home Telephone Company the results obtained were of the most successful character, the number of parties on a line making no difference in the operation of the apparatus. The company has gotten out a folder which illustrates and describes the apparatus very thoroughly. To companies operating party lines we would suggest their securing a copy.

THE VOUGHT-BERGER COMPANY, of La Crosse, Wis., has issued a very complete and comprehensive catalogue describing the various appliances and apparatus it makes. The catalogue is made up in the loose leaf form so that additional pages can be added as received. One very commendable feature is the shape and size, 4 x 7 inches, which makes it very convenient to carry around. Every article or appliance necessary for a telephone system is illustrated in a first-class manner, and the general design of the catalogue is such that a separate page is used for each article. Amongst the many pieces of apparatus illustrated are the various types of switchboards this company manufactures, of which there are thirteen; central energy and magneto telephones in various styles, the Pendant telephone, a type made by this firm exclusively; intercommunicating systems, hook switches, transmitters, receivers, cabinets, lightning arresters, distributing frames, heat coils, fuses, adjustaphones, pay stations, pole changers, calculagraphs, telephone booths, cable boxes, and also ball adjusters for portable electric specialties. The latter part of the catalogue contains copies of letters received from telephone companies which have been satisfied customers. This catalogue should be secured by all parties interested in the operation of telephone systems.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—Several pieces of lead covered cable, in good condition, ranging from 15 to 150 feet in length; sizes, 50 pr., 100 pr., and 150 pr. Just the thing for small telephone companies bringing their lines into the office. Address, Box 224, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 224

FOR SALE CHEAP—Five switchboards of magneto express type, in good condition. Just the thing for small exchanges. Address, Box 225, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 225

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS !
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

POSITION wanted as wire chief or switchboard man; five years' experience with Bell companies; good reference. Address Box 229, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 229

POSITION wanted as switchboard wireman with Independent company. Familiar with all common battery and magneto circuits. Old Bell S. B. Construction man; good reference. Address, Box 230, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 230

I WANT TO LEASE a telephone plant in a live, prosperous city; one that is not earning up to expectations. Can make it pay good interest to owners. I have references and money to back me. Address, Box 219, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 219

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

WANTED—Telephone man as manager for exchange of 300 generator call telephones. One who is capable and willing to do the trouble work and all work connected with such exchange; construction first-class, Middle West. Address Box 227, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 227

WANTED—Position as Switchboard Repair Man or Wire Chief. Seven years' experience with Bell company in the above line; at present employed by Bell company in a large city; would like to make a change. Address Box 228, THE AMERICAN TELEPHONE JOURNAL, New York City. 228

UP-TO-DATE MANAGER, who has increased plant two and one-half times in two years, contract expires Sept. 1st, would like to change. Adrress Box 216, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 216

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

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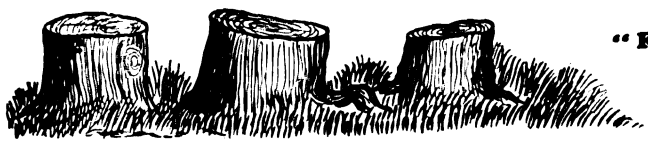
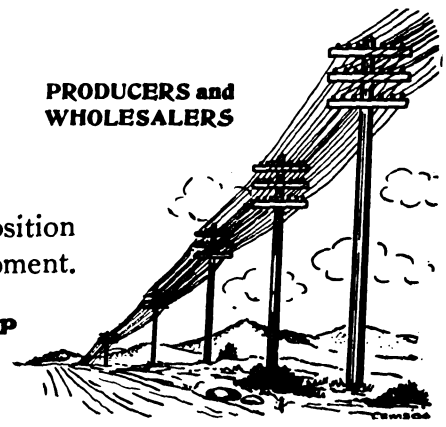


"From the Stump to the Line."



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When you want satisfaction without worry and trouble

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Other Sizes Made to Order

We make our own steel and do our own galvanizing, therefore lowest possible prices and quick shipment.

INLAND STEEL COMPANY, First National Bank Building **CHICAGO**

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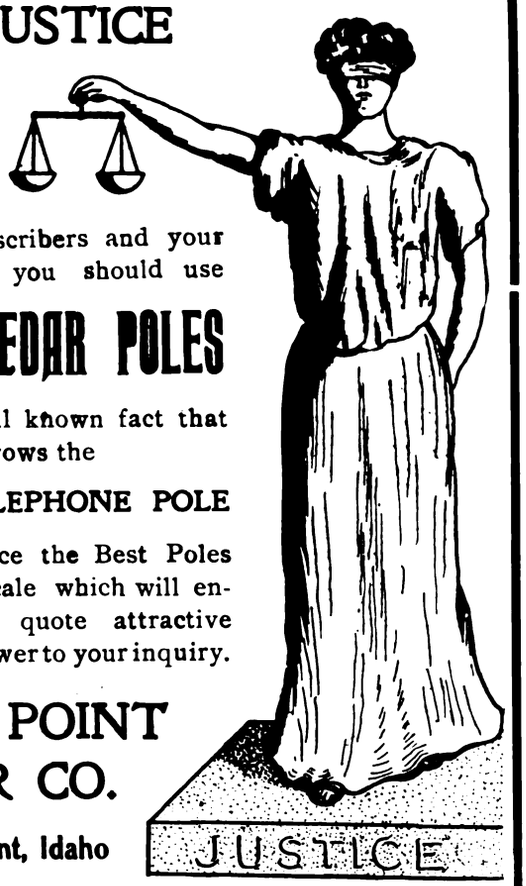

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IDEAL TELEPHONE POLE

We produce the Best Poles on a large scale which will enable us to quote attractive prices in answer to your inquiry.

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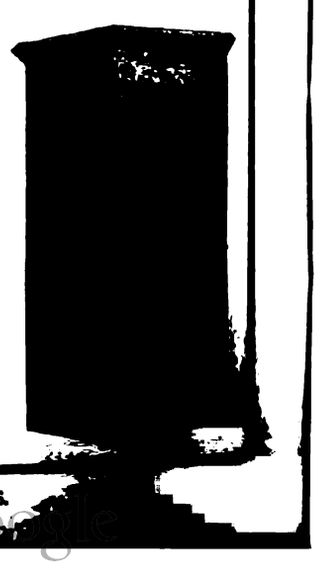

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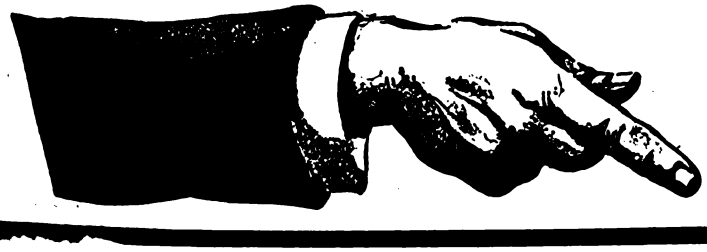
They are the American Telephone Journal (published weekly), a year's subscription for $1.00, and a copy of the new and revised edition of "The A. B. C. of the Telephone"; a practical book for telephone men. This new edition has been brought thoroughly up-to-date, and sells for $1.00. By a special arrangement we will send a copy of the "A. B. C." and give a year's subscription to the American Telephone Journal—both for $1.50.

$2.00 WORTH FOR $1.50



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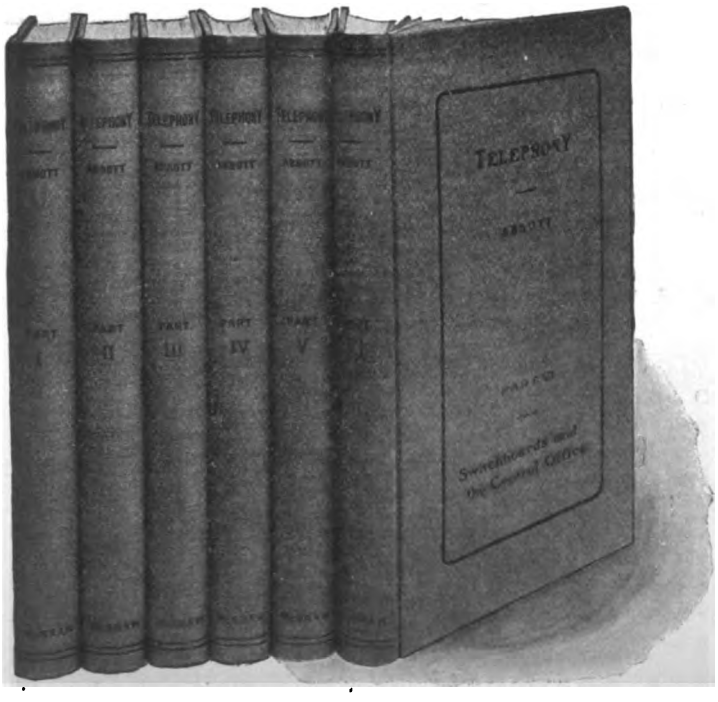

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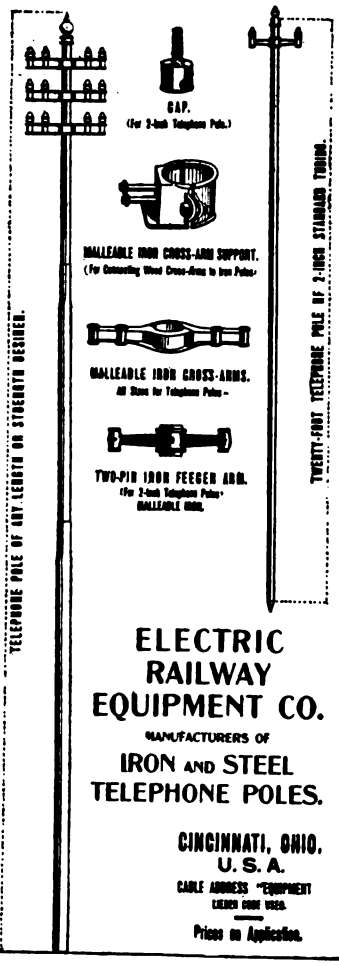

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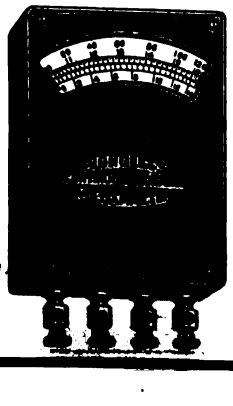

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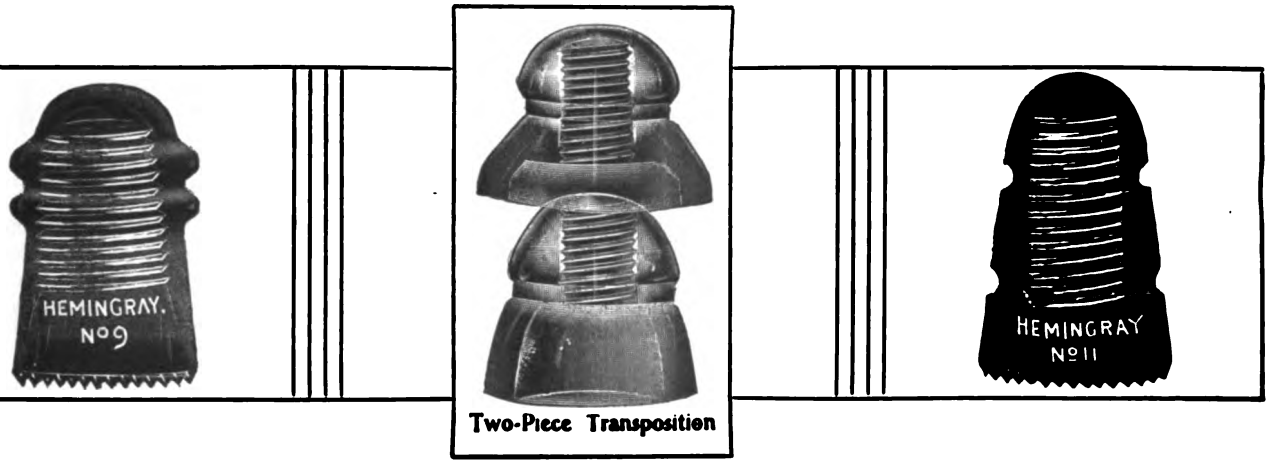

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Enclosed find.. .....for One Dollar ($1.00)
Subscription for One Year.

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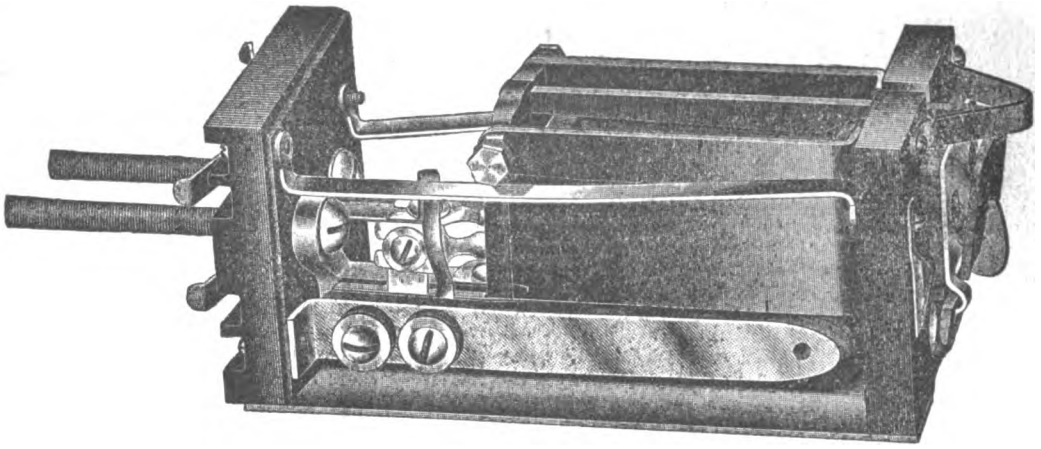
IMPROVED AMERICAN EXPRESS SWITCHBOARDS

BETTER THAN EVER



Manufactured under Patent Nos.

617,691
617,692
618,610
617,702
620,491
624,075
625,797
669,094
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692,895
579,239

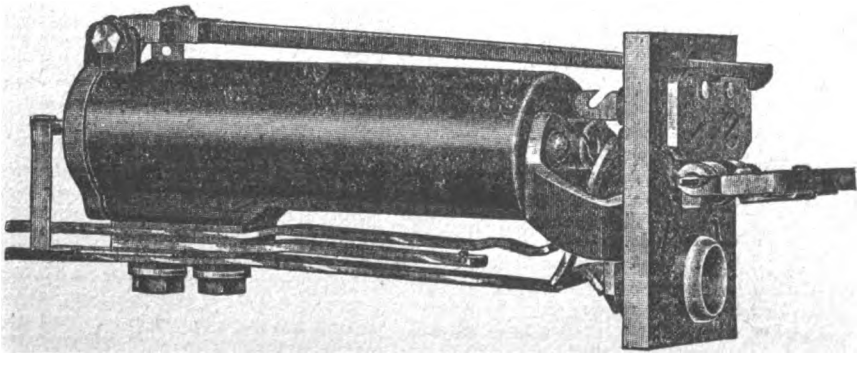
SELF-CONTAINED DROPS AND JACKS
RAPID RINGING DEVICE

All drops restored to normal position by withdrawal of plugs.

SEE ALSO OUR

BELL-EXPRESS SWITCHBOARDS

Which are built with self-restoring drops and jacks in banks of 5 and 10.



AT POPULAR PRICES

AMERICAN ELECTRIC TELEPHONE COMPANY

36-58 W. Jackson Blvd., CHICAGO

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THE AMERICAN TELEPHONE JOURNAL

A New Subscriber

Who is an officer of a NEW Independent Company writes as follows:

"Some few months ago I became interested in Independent telephony and was induced to subscribe for The American Telephone Journal. It is the very best publication with the most desirable information I ever saw. No telephone manager can afford to be without it on his desk. On these lines I enclose a check for another new subscriber."

E. B. HEYWOOD,
Claremont Telephone Co.,
Claremont, N. H.

The fact that a subscriber who has been receiving the Journal less than two months, and who is engaged in a new line of work, so appreciates this paper, is, we think, one of the best recommendations of its worth, and explains its widespread popularity

***Important Notice...*THE EDITOR DESIRES TO CALL SPECIAL ATTENTION TO THE "OPEN LETTER" WHICH APPEARS IN THIS ISSUE ON PAGE 136. IT CONTAINS MATTER THAT WILL INTEREST EVERYONE CONNECTED WITH THE INDEPENDENT TELEPHONE BUSINESS.**

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Volume 10 NEW YORK—AUGUST 27, 1904—CHICAGO Number 9

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Advertisers' Directory, Page 9

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The AMERICAN TELEPHONE JOURNAL

NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

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CONTENTS.

SOME NEW FACTS ABOUT THE POULSEN TELEGRAPHONE.....By DR. ALFRED GRADENWITZ
DISTRICT MEETINGS OF THIS INDEPENDENT TELEPHONE ASSOCIATION.
EIGHT MONTHS OF THE AUTOMATIC AT DAYTON.....By H. P. MILLER
THE FRANCHISE QUESTION AT EVANSVILLE.
IN UNION THERE IS STRENGTH.

The Operating Field.

GOVERNMENT TO OWN TELEPHONE PLANT
INTERSTATE APPLIES FOR FRANCHISE IN OMAHA
MUST AMEND ITS COMPLAINT
INDEPENDENT IN PREFERENCE TO BELL
HANAMO TELEGRAPH AND TELEPHONE COMPANY ISSUES A HAND BOOK
SOUTH EASTERN KANSAS ASSOCIATION MEETING
ORANGE AND SUSSEX INDEPENDENT TELEPHONE MEETING
A PROGRESSIVE NEW YORK COMPANY
INDEPENDENT FRANCHISE GRANTED IN ASBURY PARK, N. J.
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TELEPHONE IN THE COURTS

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THE WEEK'S MESSAGES TRADE NOTES
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SHEET BRASS

OF ALL TEMPERS

Brass Rod, Wire and Tubing

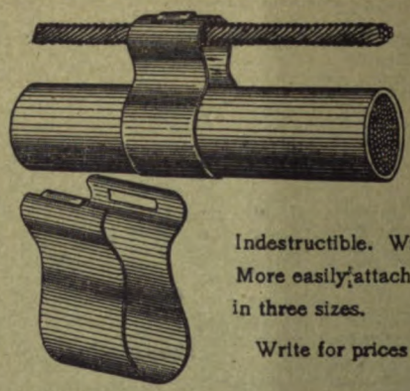
SPECIAL SPRING GERMAN SILVER FOR TELEPHONE WORK

Estimates given on Metal Telephone Parts or Special Articles of Brass, Copper, German Silver or Aluminum

Scovill Manufacturing Co.

210 LAKE STREET

CHICAGO, ILL.



The Pittsburgh Cable Clip

Indestructible. Will not slip on or cut cable. More easily attached than any other. Made in three sizes.

Write for prices and particulars.

BULLARD & McELLIGOTT, . . Room 209
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"I Saw Two Ladies

stop in a drug store and ask to use the telephone. It was an Independent pay-station, and as I'm manager of the company, I saw an opportunity to test the service, and so waited. To my amazement they walked out without using it. I followed them. They walked to a Bell pay-station. They used it! (We have more subscribers and better service too.) The Bell telephone was in a *Booth*. That's why I want you to rush the *Booth* order sent herewith."—

Extract from a new customer's letter.

W. S. SEAMAN & CO.
216 WATER STREET
MILWAUKEE, WISCONSIN

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NO CHANCE.

for cutting in and listening on your toll lines when you are using our "X-P" type condensers ∴ ∴

These are special condensers which we will tell you about if you write.

Are you provided with copies of our General Telephone Catalogue and Telephone Parts Catalogue?

WE MAKE

Extra Powerful Telephones

PRICES ON APPLICATION.

GUARANTEE.—Equip a line with twenty No. 36 X-P Type Telephones and we will guarantee to ring the twentieth telephone with eighteen receivers off the hook.

ELECTRIC APPLIANCE COMPANY

ELECTRICAL SUPPLIES
TELEPHONE MANUFACTURERS

CHICAGO and SAN FRANCISCO

WRITE FOR SAMPLE CARD OF WIRES.

Manufacturers of

"Paranite"

RUBBER COVERED TELEPHONE WIRES AND CABLES :: :: ::

INDIANA RUBBER AND INSULATED WIRE CO. JONESBORO, IND.

THE HALL TYPE D. CABLE TERMINAL

WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***
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Mountain State Electrical Company,
Sole Manufacturers,
WHEELING, W. VA.

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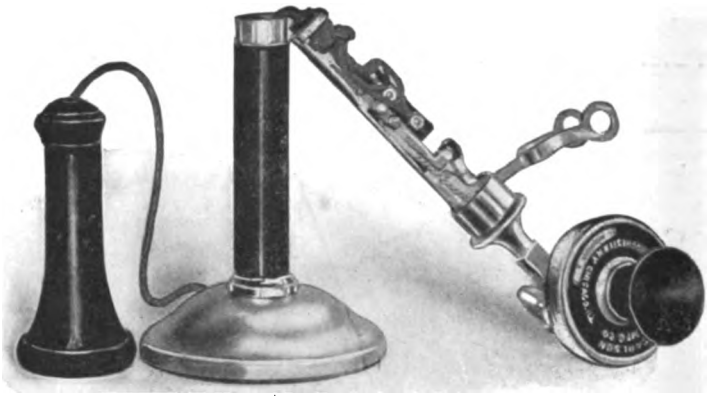
STROMBERG-CARLSON PORTABLE DESK TELEPHONE

Simple and Neat in Appearance

No Exposed Contacts or Connections

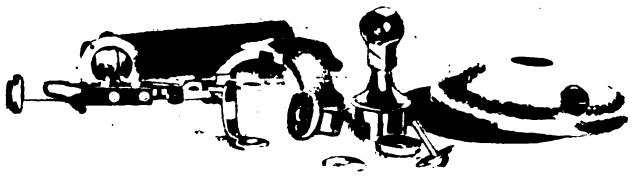
Frequently spoken of as our Kansas City Type Desk Set

A Perfect Hookswitch



Superior Terminal Fastening

A DESK TELEPHONE WITH EVERY GOOD FEATURE THAT YOU COULD WISH FOR



A MINIMUM NUMBER OF PARTS

Fully described in Bulletin No. 11-B

STROMBERG-CARLSON TELEPHONE MFG. CO.

GEN'L & EASTERN SALES OFFICE, ROCHESTER, N. Y.

Sales Department, Chicago, Ill.

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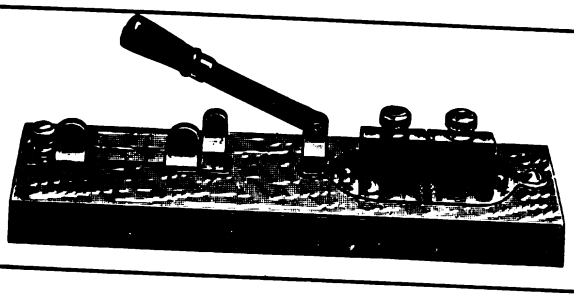
FOR GROUNDED RETURN AND BRIDGING LINES

The "Tornquist" Single Pole Combination Lightning Arrester, Ground Switch, Fuse and Cut-out.



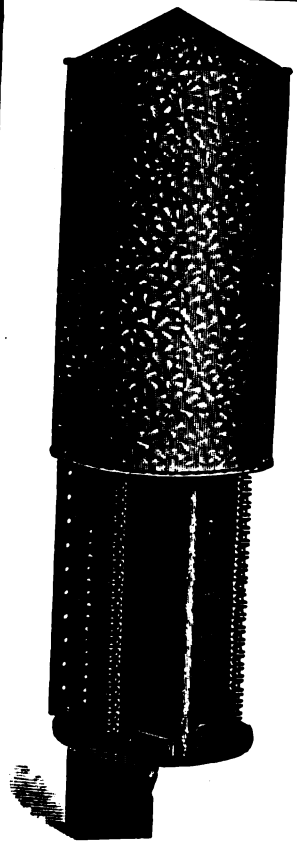
PRICE.

Single Lots,	*75 Cents.*
Dozen "	*70 "*
Two Dozen Lots,	*60 "*
Twelve Dozen Lots,	*50 "*

Special Offer--In order to introduce these Protectors, we will furnish samples until September 15th, at **35c.** each.

ORDER SAMPLE NOW.

HART & CO., Gen'l Agts., - Monadnock Bldg., CHICAGO.



Type SS.—Cook Pole Cable Terminal, with line fuse and carbon plate arresters and metal cover. Pat. May 20, 1890; Oct. 21, 1902; other patents pending. All sizes, 5 pairs up.

Insure Your Cables

AGAINST LIGHTNING OR HEAVY CURRENTS.

Cook's New Pole Cable Terminal

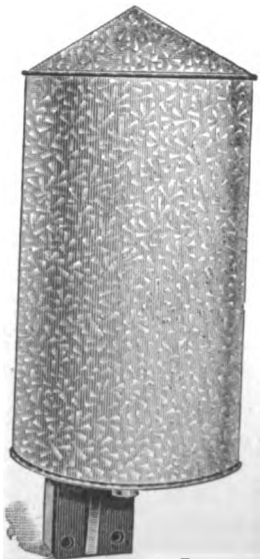
TYPE S. S. or TYPE T. T.

FURNISHES PERFECT PROTECTION.

It is **absolutely weather proof.** The **Galvanized Iron Sliding Cover** insures that. Cover stays where it is put—up or down—and locks in place automatically.

Order **Type S. S.** if you want the terminals with iron cable box.

Order **Type T. T.** if you want to use them with potheads.



FRANK B. COOK, Manufacturer,

238 W. Lake St., CHICAGO.

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AND TELEPHONE SUPPLIES
LINEMEN TOOLS, BATTERIES, WIRE, BRACKETS, PINS, CROSS-ARMS, BRACES, LAG BOLTS.
Quick Shipments. Prices are Right.
HIGH GRADE TELEPHONES AND SWITCHBOARDS.
FARR TELEPHONE & CONST. SUPPLY CO., CHICAGO.

Exchange Telephones
and Private Line Telephones, Express Switchboards, Gong Switchboards, Large or Small Transmitters, Receivers and Hooks.

A set of Bookkeeping Blanks and Ledgers Free with a $10.00 Order.

"INTERNATIONAL" PATENT TELEPHONES SWITCHBOARDS

For any size public exchange. Their quality sells our goods
Write for prices and samples

INTERNATIONAL TELEPHONE MANUFACTURING COMPANY
HARRISON AND CLINTON STREETS - - - - - - - CHICAGO, U. S. A.

THE WISE MANAGER

Knows the great value of the

TELEPHONE BOOTH

as a money maker and installs one at every public point in his town. His wisdom is further shown by using our Sound Proof Booth, which is the handsomest and best booth made for the money.

WRITE FOR CATALOGUE.

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The MONARCH Desk Set

is so simple in construction as to make trouble almost an impossibility. The switch is mounted in the base and is directly actuated by the hook. The arrangement of the springs is exactly the same as in the switch-hook used in Monarch wall telephones. No electrical connections are made with the stand. All connections are brought to a rubber block in the base :: :: :: ::

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Monarch Telephone Mfg. Co.
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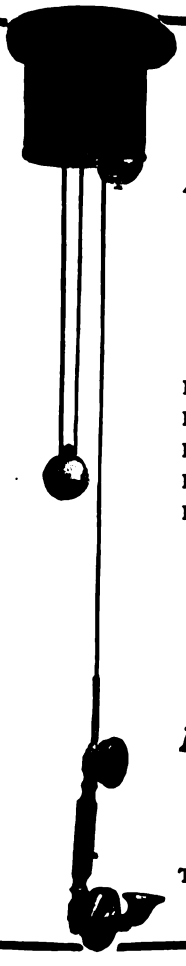
ANDRAE
"Giant" Telephones

Are equipped with a generator which will ring through a resistance equal to forty telephones on a 35-mile line—the most perfect generator made. The steel we use in its construction is harder to work than that in other generators and costs at least six times as much per pound; but it will last six times as long as others. At the same time our methods of manufacturing enable us to sell it cheaper than others. .. .. ..

Write for descriptive literature and prices, or better still order a sample telephone. If not exactly as represented send it back. .. ..

Our new catalogue is ready. Will be glad to mail a copy to any Telephone Company sending request.

JULIUS ANDRAE & SONS CO.
945 W. Water St. MILWAUKEE, WIS.



"Just a little movement,
Just the merest reach,
Adjusts and signals central,
Just because it's 'side by each.'"

Always at the crook of the elbow,

THE PENDENT TELEPHONE

REQUIRES THE SLIGHTEST EFFORT;
IS THE READIEST AT HAND;
IS THE MOST ADAPTABLE;
IS USED WITH THE GREATEST EASE;
IS THE LEAST OBTRUSIVE IN DISUSE OF ANY DESK SET OR ATTACHMENT THEREFOR.

WRITE AND LET US ENUMERATE ITS

TWENTY-FOUR EXCLUSIVE ADVANTAGES.

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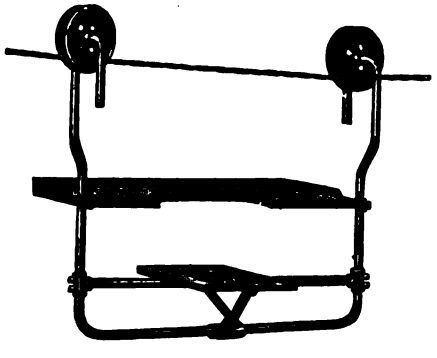
MAKERS OF FIRST-AWARD
Telephones, Switchboards and Appliances,
LA CROSSE, WISCONSIN.

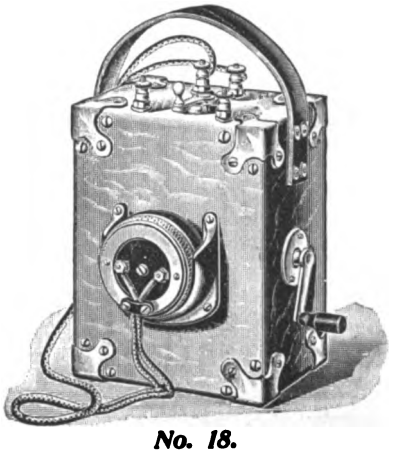
Security Specialties



A Comfortable Upper Berth

No line work is as dangerous as "Cooning a Messenger." Our "Security" Cable Cars are Safe, Absolutely, and Comfortable. (Tested for 1,000 lbs.) Write for new Booklet 118 A. T.

THE F. BISSELL COMPANY
Manufacturers and Jobbers of
TELEPHONE SUPPLIES
226-228-230 HURON STREET
TOLEDO, O.



No. 18.

Bell-Style Lineman's Test Telephone

This instrument is made upon the same lines as the Bell test sets, and is the only 'Phone of its kind made by any independent telephone manufacturing concern. :: ::

LIGHTEST AND MOST COMPACT TEST TELEPHONE MADE

Every up-to-date Telephone Man should have a copy of our new No. 8 Catalog.

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MERIDEN, CONN., U. S. A.

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The word "Kellogg" on telephone apparatus is proof of its quality and excellence. It proves that it is the highest type of telephone production and is recognized as such by experts everywhere.

There are reasons why our products have gained this reputation and our bulletins give those reasons. They will be sent on application.

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Greene and Congress Streets, CHICAGO

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CLEVELAND

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PHILADELPHIA

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This compound has all the essential properties of a perfect insulating compound. **High Melting Point. Perfect Insulation.**

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SECURE OUR PRICES ON TELEPHONE CABLE

The W. G. NAGEL ELECTRIC CO., Toledo, O.

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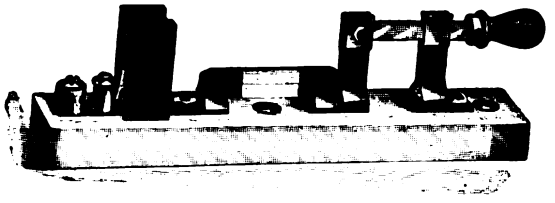
Write us for prices on all telephone parts .. ..

EASTERN TEL. MFG. CO.

WEST CHESTER, PA.

King of Protectors



No. 501 Porcelain Base. Price, each 40c.

Special prices in quantities. Write for circular.

Harvard Electric Company

62 W. Van Buren Street, Chicago, Illinois.

STORAGE BATTERIES

UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY — CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

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GENERAL OFFICES AND WORKS:
BUFFALO, NEW YORK.

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$80.00 IN 6 WEEKS

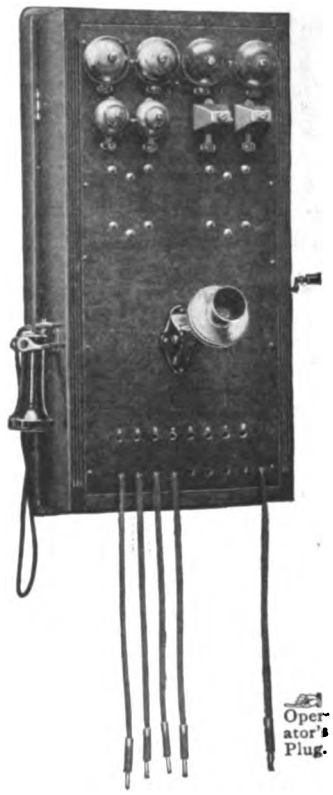
Baird No. 14 Pay Station

This amount was taken out of ONE Baird Pay Station in use in Chicago. It is only a fair sample of the enormous earning capacity of these DIVIDEND MAKERS.

Our catalog and net price list will be sent on request.

Baird Manufacturing Company
4 MICHIGAN STREET,
CHICAGO, - - - ILL.

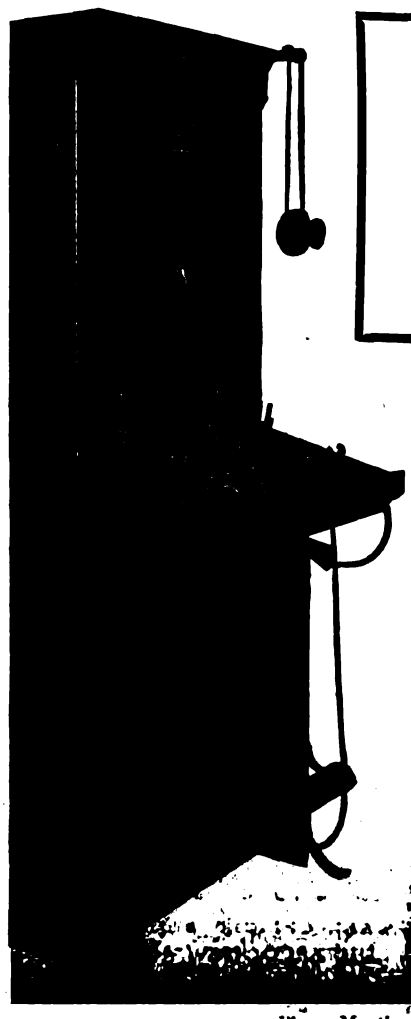
VILLAGE RINGER SWITCHBOARD



8 LINE CAPACITY.
MADE ALSO IN 20 LINE CAPACITY.
Illustration shows 4 lines installed

AND WE MAKE OTHER TYPES OF SWITCHBOARDS. TELEPHONES TOO.

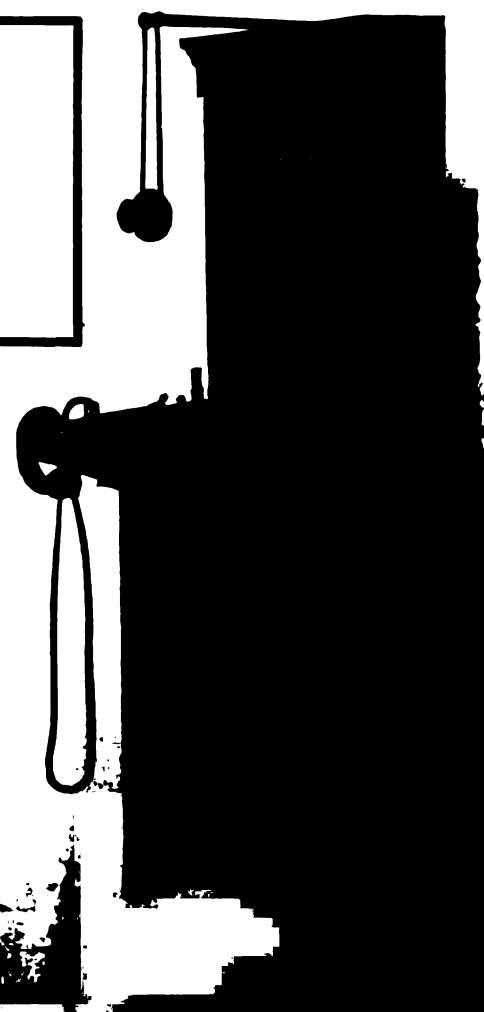
S. H. COUCH CO.
TELEPHONE MANUFACTURERS
162 Pearl Street - Boston, Mass.



SWITCHBOARDS
TELEPHONES
PROTECTORS

If You Don't See What You Want, Ask For It

WE MAKE IT



Sterling Electric Co.
LAFAYETTE, IND.

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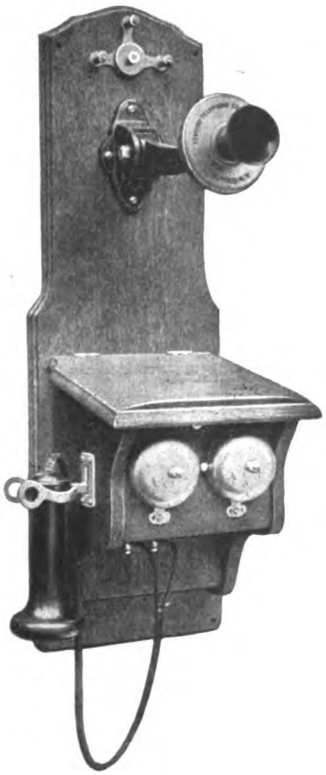
CENTURY
100% GOOD

CENTURY COMMON BATTERY TELEPHONES



SUPERIOR IN EFFICIENCY,

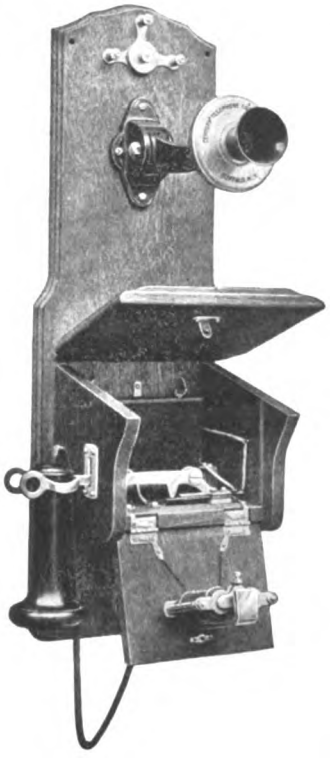
QUALITY, DESIGN

EQUIPPED WITH

THE CENTURY

PLATINUM ELECTRODE

TRANSMITTER



HAVE YOU EVER TRIED THEM?

LET US SEND YOU A SAMPLE.

OUR BULLETIN No. 11 WILL BE SENT ON REQUEST

CENTURY TELEPHONE CONSTRUCTION CO.

OFFICE & SALESROOMS
528-540 ELLICOTT SQ.

FACTORY & WAREHOUSE
481-489 WASHINGTON ST.

BUFFALO, N.Y.

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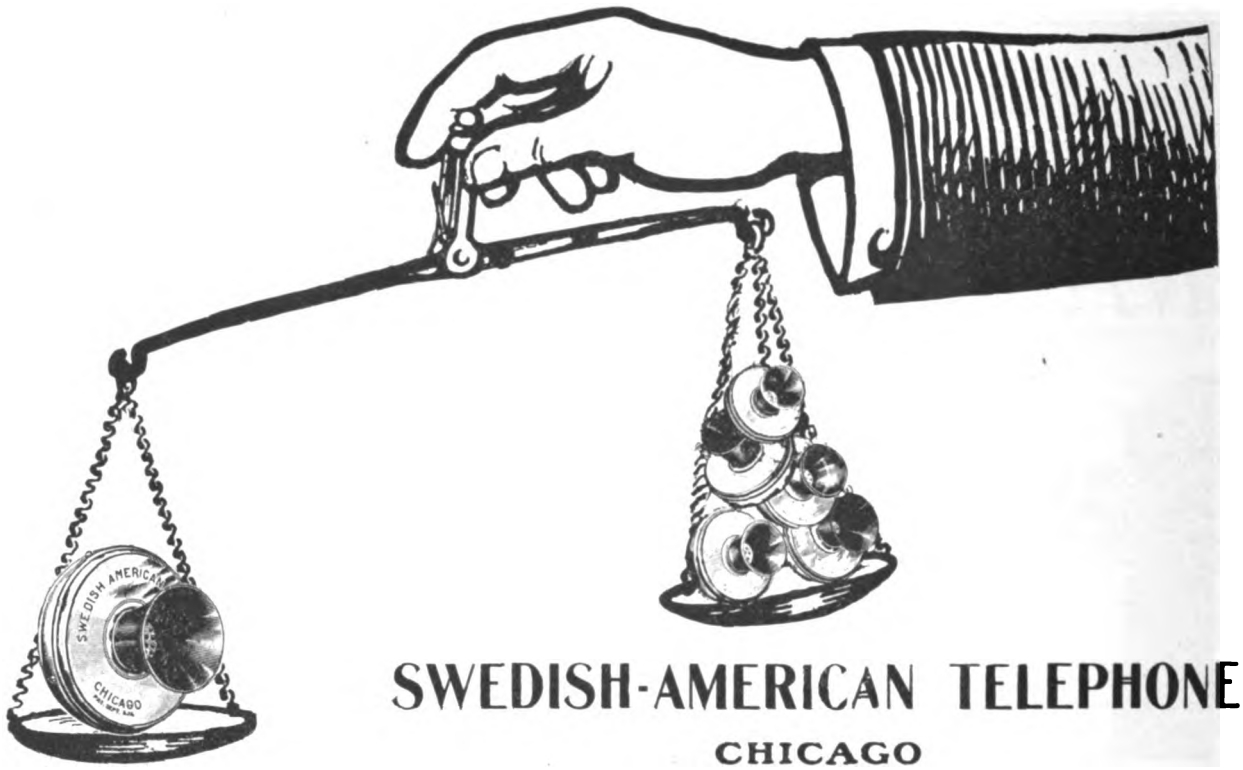
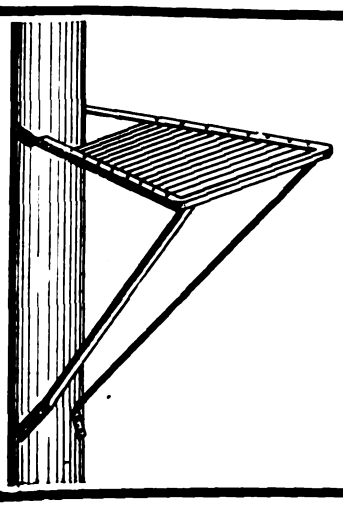
The Balance of Power



SWEDISH-AMERICAN TELEPHONE CO.

CHICAGO



WE SELL POLE SEATS,

Whether it's 1 or 1,000, **cheaper than anyone else on earth,** because we make them by machinery

"DON'T GO TO A BLACKSMITH."

Write for Quotations

HUBBARD & CO., MURTLAND BUILDING, Pittsburgh, Pa.

THE T. & A. SELECTIVE "CENTRAL" CALL RELAY AND EQUIPMENT

FOR

Generator call Party Circuits, Single Wire GROUND Lines, Straight Metallic, or "Divided Circuit" Metallic Lines.

SUBSCRIBERS,

Call EITHER of Two Centrals Without Disturbance ELSEWHERE.

SUBSCRIBERS INTERCOMMUNICATE without disturbing EITHER CENTRAL.

Simple, Reliable equipment for old Telephones. Write for prices and particulars.

THE T. & A. SELECTIVE CALL CO.,

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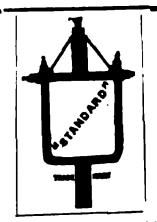

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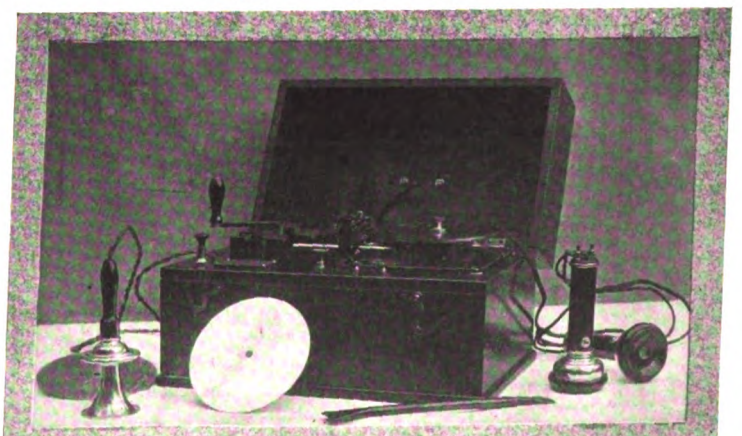
SOME NEW FACTS ABOUT THE POULSEN TELEGRAPHONE

By Dr. Alfred Gradenwitz.

Editor's Note.—The following article dealing with some recent improvements in the Poulsen telegraphone, has been specially prepared for The American Telephone Journal by Dr. Alfred Gradenwitz, who has exceptional facilities for acquiring the latest and most authentic information regarding this somewhat remarkable invention. There appear to be many cases where a record of a telephonic conversation would be of great value. In case a subscriber cannot be found it is often of great advantage to leave a message for him. In many instances business is transmitted over the telephone of which a record would, in the future, be of the greatest value to prevent misunderstandings. To achieve such a result has been the dream of many an inventor, so far, with imperfect success. The telegraphone appears to combine both the sensitiveness and accuracy which is necessary for the purpose, and to The American Telephone Journal it seems one of the coming improvements which the operating companies would do well to study as promising a means of furthering the usefulness of the telephone as a wide reaching and extensive system.

A COUPLE of years ago an invention termed the "Telegraphone" was announced, whereby it was possible to record and audibly reproduce telephone messages. Though seemingly of much promise, few practical applications resulted; but now the discussion of this interesting apparatus is being revived. This, we think, is due to the fact that the inventor has been engaged in continuously improving his apparatus, and having put it in a definite form, a concern under the firm of "Aktieselskabet Telegrafonen" has been started in Copenhagen, so that the apparatus is soon likely to enter an industrial stage.

Fig. 1. Parts of Plate Apparatus.



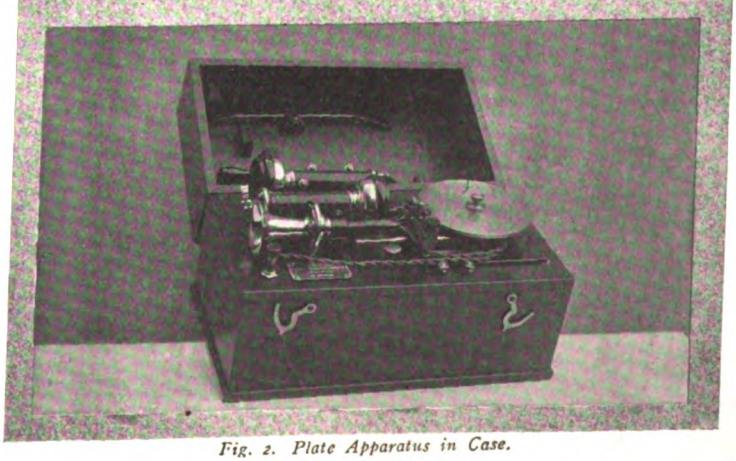


Fig. 2. Plate Apparatus in Case.

The problem or recording and reproducing the human voice has been solved in different ways. Beside the well-known types of phonographs and gramophones, where the record is made mechanically by the movement of an oscillating point, there are some optical and electromagnetical devices, presenting in the first place the advantage of being free from any disturbing secondary noises, so as to reproduce the human voice without any alteration. The former type of apparatus, embodied by Ruhmer's *photographophone*, uses the photoelectric properties of selenium cells, which, though apparently of great promise, are still in an experimental stage. The *electromagnetic phonograph*, as invented by a Danish engineer, Mr. V. Poulsen, to whom I am indebted for information and illustrations contained in this article, is based on the following principle:

On a cylinder there is wound a steel wire or steel band, running in front of the poles of an electromagnet, to the poles of which a microphone is connected. On speaking into the microphone, induced currents produce continuous variations in the field strength of the electromagnet and coils causing changes in the magnetism produced by the latter in the steel wire. This magnetism is permanent and serves to register language. Reproductions are made as follows: The steel wire bearing the electromagnetic record is drawn along before the poles of a similar electromagnet inserted into the circuit of a telephone, so that the process will be repeated in inverted order, acoustic vibrations analogous to the original vibrations being produced in the telephone membrane.

A special advantage of the telegraphone in all its different forms is the ease with which the record may be erased. It is only necessary to saturate the steel wire with magnetism by drawing it in front of a more powerful magnet, so as to compensate any magnetic "level differences," the wire becoming as susceptible of further records as it was before.

The efficiency of the reproduction is specially important; the reproduced language currents are, as a rule, much weaker than those operative in recording. Both in recording and in reproducing, there are losses of energy, due in the former case to the demagnetization of the wire, in the reproduction to the imperfect utilization of the lines of force. The demagnetization of the wire should therefore be prevented as far as possible; both *the speed* and *material* of the wire play a very important role in this connection. The higher the speed with which the record material is drawn along before the electromagnet, the greater will be the length of the sound wave registered and the smaller the demagnetization. In the case of the electromagnet being a one-pole magnet, the efficiency increases with the speed. The conditions are somewhat different if a two-pole magnet is used, so as to form

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the record by a magnetization transverse to the direction of motion. If the speed used has once attained such values that the length of the wave exceeds the length of the elementary magnets of the record material, the transversal demagnetization will become pre-eminent so as to make any further increase in the speed useless. With ordinary telegraphone apparatus, low speeds are necessary for practical reasons, so the record material should be magnetically as *hard* as possible.

In the reproduction much is lost by the imperfect utilization of the lines of force of the record. In order to obtain effects as satisfactory as possible, the pole of the iron core is wholly covered by the windings, as shown in Fig. 4, the iron cores usually consisting of a piece of soft annealed iron wire, about one mm. in diameter and eleven mm. in length.

As the record consists in variations of the magnetization of the steel, it is invisible, the mechanical stress produced by magnetization in the record material being so small as to be wholly negligible.

With telegraphonic reproduction of the human voice, a characteristic difference as compared with ordinary phonograph reproduction is at once noted; the reproduced sounds are wholly free from any disturbing scratching and other secondary noises, being soft and continuous, like those of the best telephone apparatus.

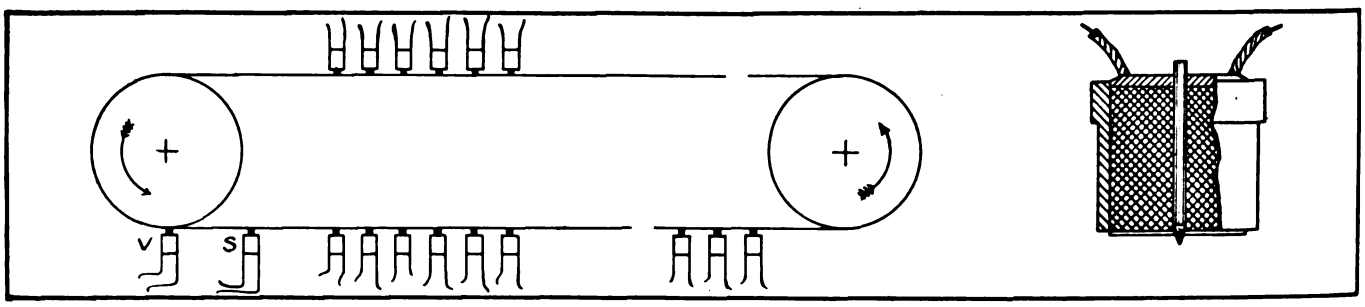
The records may be reproduced more than 10,000 times, without any diminution in the intensity or deformation being noted; the magnetism being really permanent, the record, so to say, is ever-lasting. Still, the record may, as above explained, be easily and rapidly erased by a comparatively strong magnetization of the whole record material. Moreover, the record once made may, if its intensity is sufficient, be transmitted to another record material so as to give a somewhat weaker copy. It has recently been suggested to use the telegraphone to enforce telephone currents by adding synchronous currents from a sufficient number of copies. Though satisfactory results have not so far been attained, Poulsen hopes to arrive at a solution of the problem by the use of better material and higher speeds.

If different speeches are subsequently recorded on the same record material without any previous obliteration, all may afterwards be heard at the same time; as pointed out by the inventor's assistant, Mr. P. O. Petersen, it is possible to record simultaneously two different speeches on the same material and yet hear them apart. In fact, after recording one speech with a two-pole magnet, the two coils of which are, for example, connected so as to have recording poles of opposite signs, the speech will not be heard on connecting the coils so as to give poles of the same sign; the other speech may, however, now be recorded and on afterwards using poles of unequal signs, the former speech will be heard and the latter be imperceptible. The two speeches will thus be reproduced only in the case of the mutual connections of the wire coils being the same as when the record was made.

A special application of the telegraphone is the so-called *telephone newspaper,* being an apparatus by means of which the same speech, the same piece of music, etc., may be distributed to any desired number of auditors. An endless steel band (see Fig. 3) is laid round two rotating discs, which draw the band before an electromagnet that records the news; the latter are afterwards carried before a large number of so-called *"reading-magnets"* arranged in a long series, one behind the other, each being in connection with a different telephone line. The record band eventually passes in front of an obliterating magnet, *V,* whence it again passes before the recording magnet, and so on.

In the first type of telegraphone above described, the record material consists of a steel wire wound in the form of a helix on a cylinder. This apparatus gives excellent reproductions; it, however, has a low capacity in proportion with this volume. In the so-called *coil apparatus* there is used a steel wire of a very small diameter (about 0.25 mm.), running from one coil to another, and passing on its way three or more pairs of magnets or two-pole magnets. The central pair of magnets is used for records and reproductions, whereas the external pairs are *obliterating magnets,* out of which, however, only one pair is operated at the same time. The apparatus is arranged so as to effect obliteration simultaneously with making a record, as the wire passes in front of the operative obliteration magnet before it reaches the recording magnet. The apparatus may be used in both directions, possessing a speed as high as three meters per second and a capacity of about forty-five minutes. There is an index showing the portion of the wire used at each moment. In the *band apparatus,* steel ribbons wound from one disc to another in many layers are used. These ribbons are only about 0.05 mm. in thickness and three mm. in breadth. As in coil instruments, this type of apparatus affords a very considerable speaking capacity in proportion to the volume.

About one year ago Mr. Poulsen began using a new form and arrangement of the record material analogous to those used in connection with mechanical phonographs. A polished reflecting cylinder of magnetically hard material and of similar dimensions as the well-known wax rollers is used, the speed being about 0.5 meters per second, and the pitch of the screw formed by the record about 0.3 mm. On account of these small dimensions the pole of the electromagnet must be of necessity nearly pointed. Similar cylinder instruments will give beautiful reproductions, provided the cylinder be made from suitable material. Mr. Poulsen uses in this connection preferentially Böhler steel. Electrolytic iron, with certain additions, seems as well to be suitable record material.



Figs. 3 and 4. Disc Apparatus.

Now, in the latest form of apparatus, these steel cylinders are replaced by thin steel plates, being less expensive and more convenient. A similar plate apparatus (see Figs. 1 and 2) was recently presented by the inventor to the Northern Technical and Hygienical Congress in Copenhagen. The steel plate, being susceptible of receiving records on both sides, may readily be exchanged, its dimensions (thirteen cm. in diameter, 0.5 mm. in thickness) allowing of its being put into an envelope and sent by post anywhere, in order to be reproduced on a similar apparatus. The electromagnet is arranged so that the iron core, being a piece of pointed iron wire, may easily be changed with another, in the case of a pole being worn out.

The telegraphone seems to be specially valuable in connection with the telephone in large offices, where the conversations that take place may be recorded; in small offices it may be used at the same time to give and to receive notice in the absence of the subscriber. In America such notices have been recorded on a coil apparatus located in the house of a New York subscriber, the sender being in Washington. The reproduction was extremely distinct, in spite of the great distance over which the record was made. As the telephone companies of different countries often use different arrangements, the same type of telegraphone may not be universally suitable, certain modifications in the arrange-

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ment of the circuit, as well as in the switching mechanism, being necessary. Poulsen therefore hopes to develop some other application of the telegraphone before those connected with telephony.

In the first place, there should be mentioned the easy and rapid means of recording correspondence alluded to, which is afforded by the latest type. Plate apparatus, with greater plates capable of of stronger acoustic effects, are likely to become useful in connection with instruction in language, singing and rhetoric.

In addition to the phonetic application of the telegraphone already described, this ingenious instrument seems to be fit for recording and reproducing any signals consisting in variations of a magnetic field. In this connection the telegraphone has been used to record wireless telegraphy dispatches, though the results so far obtained are not very satisfactory.

DISTRICT MEETINGS OF OHIO INDEPENDENT TELEPHONE ASSOCIATIONS

THE first district of the Ohio Independent Telephone Association held its meeting for the purpose of organizing and electing an executive committee at the Hotel Euclid, at Cleveland, O., on August 16th.

The meeting was attended by sixty-five managers of Independent companies in the district which comprises the counties of Ashtabula, Cuyahoga, Lorain, Erie, Huron, Medina, Lake, Geauga, and Trumbull. Verbal reports were made by all the managers present. In addition to the representatives of the district there were present President Beam, of the State Association; W. F. Laubach, of Akron; J. B. Rhodes, of Zanesville; G. H. Methien, of Lima; R. E. Hamlin, of Toledo; D. E. Sapp, of Mt. Vernon, and Ralph Reamon, treasurer of the State Association.

Mr. Jas. B. Hoge, chairman of the district, outlined the plan of organization for the State—each company to be entitled to one delegate to the district association for each 100 telephones or 100 miles of toll line in their system, the districts to hold semi-annual or quarterly meetings for the purpose of considering matters of importance to the district; the districts to elect annually one delegate to the State convention for each 1,000 telephones or 1,000 miles of toll lines, the State Association to consider subjects of importance to the Independent telephone companies of the State. The president of the district organization to be one of the vice-presidents of the State Association; in case this plan should meet with the approval of a sufficient number of the Independent telephone interests of the United States and should be adopted by a national association, each State could then be organized along the same lines, and each State at their annual meeting elect delegates to the national association, this meeting to be based on one delegate for each 10,000 telephones or 10,000 miles of toll line. The national association would then consider points of special importance to the Independent telephone interests of the United States and take action upon such business as might be submitted to them by the various State organizations.

Mr. Hoge gave as the four principal points to be considered by the district the following:

1. Importance of all companies adopting certain standards of equipment and operation.
2. Division of territory.
3. Guarding against a second Independent company entering the field.
4. Organizing to prevent any Independent companies becoming licensees of the Bell.

Mr. Frank L. Beam, President of the State Association, urged the importance of thorough organization along the lines suggested. Each of the companies represented was given an opportunity to make a report, and all expressed themselves as being in sympathy with the movement and promised to give the organization their hearty support. From figures given it developed that in many counties of the State there is scarcely any Bell competition, that company having no exchanges and only a few toll stations in some counties, in others the Independents have many times the number of telephones operated by their competitor. Mr. Beam spoke of the counties of Knox, Licking, Delaware and Morrow, which corner at a point near Centerburg, O., and which he and his associates have developed quite extensively. The total number of telephones operated by the Independents is 7,922 as compared with 1,685 by the Bell. In Morrow county alone the Independents having 1,500 telephones while the Bell have no exchanges and only three toll stations.

After a short talk by Mr. Clapp, engineer for the conference committee, a large map showing the long distance lines of the six companies comprising the conference committee with their connections from Pittsburg to Topeka, Kansas, was displayed. A number of designs of the shield adopted by the Ohio Independent Telephone Association and the Conference Committee of Independent Long Distance Telephone Companies as the emblem of Independent telephony for use on pay station signs, stationery, etc., were exhibited.

Mr. C. L. Norton was elected secretary for the district and the following executive committee appointed:

S. R. Newberry, from Ashtabula county; W. B. Woodbury, Cuyahoga county; E. L. Coen, Erie county; Dr. Pomeroy, Geauga county; D. Calhoun, Huron county; C. M. Grauel, Lake county; A. V. Hageman, Lorain county; B. Hendrickson, Medina county, and Washington Hyde, Trumbull county.

The second meeting of the Ohio Independent Telephone Association was held at Toledo, O., at the Boody House, on August 17.

The counties represented were Williams, Fulton, Lucas, Ottawa, Sandusky, Seneca, Wood, Henry and Defiance. These counties compose District No. 8.

After Mr. R. E. Hamblin, vice-president of this district, and acting chairman of this district, had called the meeting to order, a motion was made that Mr. H. B. Taylor, auditor of the Toledo Home Telephone Company, be made temporary secretary of the meeting; later, by a motion that was made and carried he was unanimously elected permanent secretary.

Addresses were then made by Mr. Frank L. Beam, President of the Ohio Independent Telephone Association; Mr. J. B. Hoge, vice-president of District No. 1; Mr. M. B. Overly, general manager of the United States Telephone Company; Mr. D. E. Sapp, vice-president of District No. 9; Mr. Morrison, connected with the Toledo Home Telephone Company, and Mr. Cyrus Hulling, of Columbus, O.

The thorough knowledge of the Independent situation that was brought forth in the addresses were of such character that the most beneficial results will be the outcome. Following these addresses, the secretary called the roll of the individual representatives of the counties mentioned. The information obtained of the conditions prevalent in this district was carefully noted, and the immense amount of enthusiasm displayed for a co-operative spirit made the meeting very spirited, and a great success.

The executive committee that is to represent each county was not selected Wednesday, inasmuch as the conditions of this district are of such importance that the chairman thought it advisable to weigh the matter and select, after due deliberation, representatives whose work would be most beneficial to the county that they would represent.

Mr. Stinson, operative manager of the Toledo Home Telephone Company, gave a very interesting talk on the many benefits that they have voluntarily offered to their patrons at Toledo. Judge Donnelly, of Henry county, and Mr. O. L. Spangler, of Williams county, besides other representatives, made addresses, in which they set forth the conditions that were associated in the territory that they represented.

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EIGHT MONTHS' OF THE AUTOMATIC AT DAYTON

By H. P. Miller, *General Manager of the Home Telephone Company.*

H. P. Miller,
General Manager.

THE Home Telephone Company, of Dayton, Ohio, was organized in 1901. The officers are J. T. Barlow, president; J. C. Reber, secretary and treasurer, and H. P. Miller, general manager. The plant was built during 1902 and 1903, the work being completed and the installation of instruments begun in July, 1903. No charge was made for services until October 1st of that year; at that time there were 1,800 telephones connected; the growth since then has been steady, until now there are over 3,500 stations connected.

Dayton has a population of about 100,000 people, and is one of the most important cities in the State; therefore, the exchange has been constructed with a view of taking care of future growth, as the following description will show.

The company owns its own building, which is of pressed brick, five stories high, modern in all its equipments and built for the purpose for which it is used. The automatic switches are located on the top floor and are amply provided with light afforded through skylights and from three sides. The automatic installation consists of 6,000 switches, so arranged that an ultimate of 19,000 can be connected. The toll board is located on the fourth floor and consists of seven positions, one of them being equipped for rural lines. On the fourth floor are located the general offices of the company, contract office, wire chief's equipment and the protector mount. Underground cables are brought into the building in the usual way through a shaft. There is an underground cable capacity entering the office for 6,600 circuits with vacant ducts sufficient to bring in as many more.

The underground plant consists of twelve miles of trench and eighty-two miles of conduit. The aerial construction within the city is entirely cable, no cross-arms or open wire being used except in very thinly settled suburbs. Ten, twenty-five and fifty-pair terminal heads are used and each cable pair in the exchange is multipled on an average of three times. The Hall can-top for distributing purposes is used, made by the Mountain State Electric Company, of Wheeling, W. Va. Three-braid twisted duplex is used exclusively for drop wire and insulated weather-proof wire is used for return ground, so that the chances for outside trouble are reduced to a minimum.

The past winter was a very severe one for telephone plants in this section of the country, so that the efficiency of this class of construction has been well tested. The small amount of trouble which has shown up proves that it is an economy to use this method of construction. The outside troubles have averaged about thirty cases per day for the past eight months; this includes instrument, line and cable plant. Switchboard troubles average about ten cases per day; in all a total of forty cases per day, or an average of a fraction over one per cent. The troubles with the automatic switches at this rate do not average as much as the item of cord trouble alone would be with a manual board.

The cost of operating, maintenance, fixed charges, including taxes; general expense, including salaries of solicitors securing new business, for the past eight months has been at the rate of $44,413 per annum; dividing this by an average of 3,000 stations, which would be fair on an eight months' basis, the cost per station is a fraction less than $15 per annum. The total revenue per station is now $30.50 per annum. The rates charged are $40 per annum for business, no discount, and $28 per annum for residence, with a discount of $1 per quarter if paid before the fifth of the month.

A manual exchange of 3,500 stations, at the salaries paid in this section, could not be operated for less than $65,000 per year. The increased cost of operating and maintenance of this exchange, when it reaches 5,000 or more stations, will be very small, as it will not be necessary to add any additional men in the switchboard room and no more to the clerical force; the only increase would probably be an addition of two inspectors on the outside. The maintenance force now consists of five switchboard men, who look after the switches day and night; five inspectors on the outside, a wire chief, assistant wire chief, trouble clerk, cable record work and information operator. A city foreman and his force of linemen are used almost entirely for the installation of new subscribers.

The method of handling the toll business is very simple. The subscriber wishing a toll connection calls 6131, just as though he were calling another subscriber. The switch connected with his instrument selects or picks up the first trunk to the toll board which is not busy, lighting the lamp signal before the recording operator, who answers him with a cord and plug in the usual manner. There are twenty trunk lines from the switches to toll board, so that there is no chance for a subscriber not coming in to the recording operator promptly. By this method the "B," or switching operator, which is always necessary with the manual equipment, is done away with. When a long distance call comes for a subscriber, the line operator inserts her plug into a jack, which is connected with one of a series of trunks going to the switches, operates her dial for the number she wishes to call—each operator's position on the toll board being equipped with a calling dial—and picks up the subscriber direct, just as though another subscriber had called him.

Home Company's Exchange Building.

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The rural or farmer line service is handled in a similar way. The subscriber on a country line calls in by magneto, signals the rural operator, who answers and calls the automatic subscriber with the dial located on her switchboard position. The city subscriber calls as he does for a toll connection and the rural operator makes the connection and rings the country station in the usual manner.

The service is giving universal satisfaction to the public, as the steady growth of the plant would indicate; in fact, the subscribers are enthusiastic. A few months since, the Automatic Electric Company, of Chicago, sent out about 200 letters to the subscribers in Dayton at random, asking them to give an expression of opinion as to the service; over 200 replies were received, and they are all of such a nature that they could be used as testimonials. Next to Grand Rapids, Mich., Dayton has the largest automatic telephone installation in the world.

THE FRANCHISE QUESTION AT EVANSVILLE

A RECENT statement that the mayor of Evansville, Ind., had instructed the Board of Public Works to pass a franchise submitted by the Cumberland Telephone Company has again brought to the front a situation in the Independent field which illustrates to what ends the Bell Company will go to secure the desired results. A résumé of the situation may be of interest to those of our readers who are not acquainted with the facts.

In the year 1902 the franchise under which the Cumberland Telephone Company had been operating expired and since that time the company has continued to maintain its system.

A suit was brought by the Cumberland Company against the city soon after the expiration of its franchise in 1902 to restrain it from cutting down its poles or otherwise interfering with its operation. A temporary injunction was secured by the company and the case was taken before the Federal Circuit Court to have the injunction made permanent.

In 1903 there was formed in Evansville a so-called municipal telephone company, capitalized at $100,000. Extensive plans for the installation of a city system were prepared, and a franchise was readily granted this new company. About $10,000 was spent in giving the company a start when a Democratic attorney brought suit against the "municipal" company as illegally existing, secured a verdict from the State Court of Appeals dissolving the company and revoking the franchise.

Four months ago an Independent company, called the Citizens' Telephone Company, applied for a franchise. The administration indorsed the new company because it promised to pay off the debts of the defunct "municipal" company, but the terms of this franchise were objectionable and it was withdrawn.

There was then presented to the Board of Public Works a petition for a franchise by the Home Telephone Company. This company offered the city $3,500 a year for a twenty-five-year franchise, and submitted a very fair proposition in regard to the rates to be charged. The rate question is probably one of the most important of any, in respect to public opinion; it being generally understood that no franchise could be granted that did not specify that subscribers on a four-party line should not be charged more than $1 per month.

Everything began to look favorably for the Home Telephone Company's franchise being brought up for discussion before the board at an early date, when an intimation was made to the Mayor, the Board of Public Works and the city councilmen, that the Cumberland Company was about to make a proposition that would be of interest, and for them not to take up the Independent company's petition. The inside information was that delay was valuable, as it would let public sentiment die out in the demand for the $1 telephone, and as a private inducement, so it is said, the Cumberland Company would make good all losses incurred by the city officials in the "municipal" venture.

The tip was effective. The Home Telephone Company's franchise has never been recognized as received, its defects have never been pointed out to the stockholders, and they have never been called before the board to ask if they would make a change inserting a clause covering the $1 telephone. What the objection of a seemingly favorable board was to the passage of the franchise has never been found out. The public were at a loss to understand the move, and they demanded action as they did not want to be left without a telephone service this winter.

On July 30 came the announcement that the Cumberland Company would, on the following Monday, present a petition for a franchise. The move was entirely unheralded and unlooked for by the public, but it cleared up the mysterious disregard of the Home Telephone Company's franchise by the administration.

When it became known that the franchise had been presented to the Board of Public Works and a copy placed on file in their office, the newspapers telephoned and asked for a duplicate. They were told that but one copy had been field, and were offered the privilege of copying it. C. N. Katterjohn, of the Cumberland Company was then communicated with and asked for a copy. He replied that the franchise had not been presented to the board. When the reporters again went to the Board of Public Works they were met with the statement that the franchise had been withdrawn.

On the thirty-first the Evansville *Courier* made a prompt exposure of this underhand move which further strengthened the antagonism of public sentiment against the Cumberland.

The exposure had good results. The franchise was not presented the next day. Instead, inquiry at the Cumberland office met with the response that it was all a mistake, and that the scare the *Courier* had started was a bugaboo.

Three days had passed when the announcement was made from the Mayor's office that the Cumberland Company would present a franchise at the Saturday's meeting of the board and that it would be passed. The Mayor then left for St. Louis.

This information caused a secret meeting of the business men of Evansville to be called, at which a committee was appointed to call on every member of the Board of Public Works and find out his intention as to the franchise. Four were found absolutely non-committal. A fifth stated that "he was no slave to the administration and that he would resign his position before he would be accused of openly selling out to the Cumberland Company by espousing their franchise, should it be presented." The apparently hostile attitude of the majority of the members of the board caused a vigilance committee to be formed, the object of which was to oppose any move the members of the board might make to act favorably on the Cumberland franchise.

From an editorial published in the Evansville *Courier* of August 6th, we quote the following, which thoroughly expresses the feeling of the public:

> We regard a monopoly of the telephone service of Evansville as worth from $5,000 to $10,000 a year for a period of no more than twenty-five years, and a competitive franchise as worth $3,500 a year.
>
> We are opposed to granting a franchise for a longer period than twenty-five years, and to any franchise that does not restrict the maximum rates, insuring the poor man a telephone service at a rate within his means.
>
> To grant a franchise at the present time would be to fail to realize its full value.
>
> To grant a franchise for a period of forty-five years would be a crime against the future and greater Evansville.
>
> To grant a franchise placing no limitations on the rates would be a crime against the people in whose interest the franchise must be made.
>
> To grant a monopoly for $2,250 a year would be a crime against the financial interest of the city, selling a thing of value for a half, a third or a fourth of its worth.

In another editorial the *Courier* says:

> We desire to point out to the people of Evansville that the interests of the city and of the people are being betrayed by the servants they have elected as trustees and guardians of their interests in the deal that has been made, all the terms of which have not been made public and never will be.

On Saturday, August 7th, the date set for the passage of the Cumberland franchise, the Mayor appeared unexpectedly whilst the Board of Public Works was in session and just at the time when the Cumberland's attorney laid the franchise on the clerk's table. The absence of one of the members of the board and the presence of the vigilance committee probably caused the Mayor

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to reconsider his position, for, after a hurried talk with each of the members, in which he was told of the storm his announcement that the franchise should be passed had made, he instructed the president of the board to announce that there was no business to be taken up and the board to adjourned, the franchise being pigeon-holed. Another meeting was adjourned, there was no business but the Mayor would not allow any action to be taken in the matter.

In comparison with the Independent franchise, which the board has had before it for three months, the Cumberland petition appears at a great disadvantage, it being evident that its acceptance would be nothing less than robbery.

The Home Telephone Company offers the city in return for an exclusive franchise for twenty-five years $3,500 a year and also sets forth a reasonable schedule of years $3,500 a year and also Cumberland Company asks for an exclusive forty-five-year franchise and agrees to pay $2,225 a year. It makes no statement as to the rates to be charged, but does agree to pay the costs of the suit against the city. Since the general opinion is that its suit will be decided in favor of the city it is apparent that its offer in this regard has no value.

Commenting upon change in attitude of the city administration in favor of the Cumberland Company the Evansville *Courier* asks:

Why does the administration propose to give the telephone company a franchise that leaves the people wholly unprotected against exorbitant charges for nearly half a century?

The mayor's only excuse for favoring it is that the city is deriving no compensation at the present time from the telephone franchise. But he ought to know that the city will have a rightful claim for compensation during all this time the company is operating without a franchise, under the protection of the court.

The people of Evansville are now fully alive to the situation and threaten, if the Cumberland is granted the exclusive franchise, to impeach all the city officials who have anything to do with this scandal.

Compliments of THE SOUTH BEND HOME TELEPHONE COMPANY

IN UNION THERE IS STRENGTH.

PROGRESSIVE Independent telephone companies throughout the country have learnt by experience the truth of the old adage, "In union there is strength." As a result throughout the country associations have been formed for the purpose of strengthening the mutual interests of the various Independent companies that are members. One of the most progressive as well as aggressive of these alliances is the Northern Indiana and Southern Michigan Toll Line Association. The fifteen companies which form its membership have a total of 18,500 subscribers in a territory where the Bell formerly held full sway.

At a recent meeting of the association the above cartoon, which is a clever adaptation of one published by THE AMERICAN TELEPHONE JOURNAL, December 5th, 1902, was gratuitously distributed. Attention is called to the list of companies together with their individual number of subscribers, so that some general idea can be gained of the strength of Independent telephony in that part of the country. In this particular instance the effective toll-line systems of the association have caused the overthrow of the Bell monopoly, and so thorough has been the construction of the network of lines that the power of the modern Gulliver has been completely nullified.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

LINE LEAKAGE—(410).

Why does our toll line 15 miles in length, transmit so poorly in wet weather? L. K.

We would advise an immediate examination of the line to discover the existence of broken insulators, dirty insulators and branches touching the wire. Leakage on lines is a common occurrence, as shown in *a, b, c, d, e, f,* in spite of the fact that each insulator possesses an enormous resistance that can only be measured in millions of ohms. The situation is something like that illustrated, where each pole carries an insulator and an incrustation due to dust, and moisture gradually forms a film over the

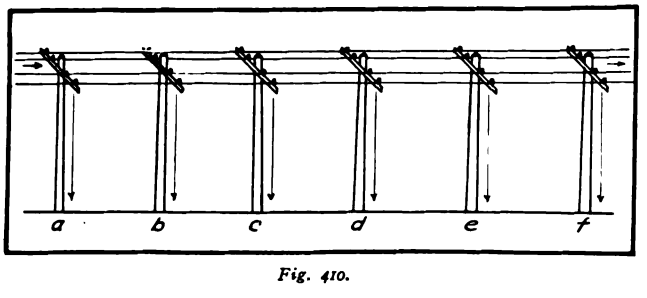

Fig. 410.

surface of the insulator through which a minute current leaks away to the pin and pole and finally to the earth. It would be difficult in any case to remove this fault except by an inspection of the line systematically. If the insulation resistance of one insulator is 5,000,000 ohms on the average, then on an estimate of 40 poles to the mile for 15 miles there would be $80 \times 15 = 1{,}200$ points of contact between insulators and wire. The insulation resistance would be $5{,}000{,}000 \div 1{,}200 = 4{,}250$ ohms total line resistance. For double the length of line the resistance diminishes in proportion until with a very long line and wet weather the insulation resistance may be so low that clear speech is impossible.

CURRENT FOR BRANCH EXCHANGE—(411).

How can we overcome the following difficulty? We supply private branch exchanges with battery from central office potential 24 volts. Some of the leads run as high as 50 ohms resistance, consequently when the exchange has several pairs of cords in use the voltage drops so low that transmission is very poor. E. H. R.

In reply to your query we beg to advise that there are only two ways that we know of to remedy the difficulty of which you speak. One is to locate at the private branch exchange a small storage battery which shall be continuously charged over the leads which you know that by giving this battery sufficient capacity it will be able to supply the demand when several pairs of cords are in use and will be recharged by the current which flows during hours when the switchboard is not in use. The other method is that of providing good conductors of lower resistance. If your present leads are in cable this may be accomplished by using several pairs in multiple arc. If aerial wire is used the same expedient may be resorted to, or heavier wire installed.

CAPACITY OF CABLE POLE FUSES—(412).

What should be the capacity of cable pole fuses for magneto and also for common battery lines? S. L.

The object of the cable pole fuses is to protect the wires in the cable from excessive currents in case the open wire line shall become crossed with an electric light wire or other conductor carrying dangerous quantities of electicity. As the cable conductors are only insulated with paper, it is obvious that when they become unduly heated the insulation will be burned out and the cable ruined, so that it is necessary to provide a fuse, whose carrying capacity is such that it will melt and open the line before the insulation of the cable conductors can be injured. On the other hand, if too small a fuse is used, it may often accidentally break and thus cause trouble to subscribers and expense in replacing it, so that it is necessary on the one hand to provide a small enough fuse to protect the cable and on the other hand a large enough one to avoid frequent accidental ruptures. Experience indicates that from common battery work, a fuse having a carrying capacity of from 5 to 7 amperes is desirable. This provides protection to the cable wire and does not often accidentally break. For magneto exchanges it is customary to use one from 3 to 5 amperes, because as there is no battery upon the line, a more sensitive fuse can be used, without too great a probability of accidental interruptions.

SERIES LINE—(413).

We have a series line carrying about ten telephones. These instruments all work well when used on a line alone, but when connected with a bridged line they seem dead. Can you give us any reason for this and tell us how to remedy it? A. T. Co.

From what you state the trouble is due to the fact that a series line will not give good transmission under any circumstances. This is due to the fact that the ringer coils of the bells at each station not in use act as retardation coils and reduce the transmission qualities of the line. Since this is true of every instrument on a series line, it is quite possible that the trouble is not noticed till the series line is connected to a bridged line, when the party on the bridged line notices the difference at once between the talking qualities of the series instrument and one on his own line. This is due to the fact that in the case of bridged instruments the ringer coils, being bridged across the line and not in series, offer no hindrance to the rapidly vibrating voice currents. We would recommend replacing the series instruments with bridging ones, which will undoubtedly clear the trouble.

CONDUIT ENVELOPE—(414).

What are the standard dimensions for the concrete envelope surrounding a vitrified clay conduit? G. L.

There are no standard dimensions since the position of the conduit with reference to its surroundings, varies. Where there

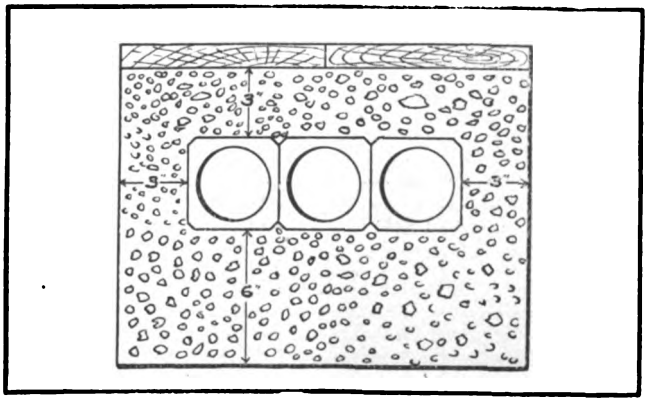

Fig. 414.

are no other underground structures to interfere the general dimensions of the concrete envelope are as illustrated in Fig. 414, and these may be taken as standard.

BATTERY WIRE CORRODED—(415).

A wire connected with our battery is corroded. The battery is compound, partly of wet and partly of dry cells; would this cause the trouble? J. E. S.

It would not. There is some local trouble in connection with the wire. The insulation may have been allowed to become damp and mouldy, or sal ammoniac or some other corrosive agent may have gotten on it. Examine the lead carefully and you will find that the trouble started from some such cause.

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THE TWO TELEPHONE BUGABOO.

THE editor believes that he can make no better use of the editorial page this week than to reproduce, practically in full, an open letter "To the Public," just issued by the Independent Company that is seeking a franchise in Green Bay, Wis.

For two years the people of Green Bay have demanded telephone competition, and for two years the Bell people have been fighting the proposition in the customary manner—misrepresentation, brow beating, misuse of the newspaper columns, and underground work directed against the investment of capital. It is the same fight at Green Bay that is being waged at Omaha, where a competing company has asked for a franchise; at Milwaukee and other places. The Omaha papers for months have been full of carefully prepared articles purporting to be "special correspondence" from other cities where two telephone systems are in operation. In reality, of course, these articles are paid for by the line at high rates out of the "defense fund" the parent Bell Company is distributing these days with so lavish a hand. It is evident that the Green Bay Independents do not intend that the Bell Company shall mislead the people there, and the open letter is the first in a series of newspaper communications that are designed to set the matter before the people in a straightforward manner.

There is material here that may be used to advantage by other Independents that are compelled to meet this sort of warfare. The "Open Letter" answers the "two telephone" bugaboo in a masterly manner.

The Bell Telephone Company started business, through various licensed companies, such as the Wisconsin Bell Telephone Company, in 1878. After twenty-six years of absolute monopoly we find the Bell Company giving telephone users in Green Bay the same class of service with the same identical kind of instruments as that company originally installed when starting in business twenty-six years ago. The Bell Company, therefore, has done nothing voluntarily to better equipment or improve service for the people of Green Bay. Yet they charge here for such inferior apparatus and class of service materially higher rates than they do for their improved service and improved instruments in other Wisconsin cities where they have been forced by competition to make a change in both equipment and rates. Prior to the efforts of competition to secure a foothold in Green Bay and give its people the resultant benefits of competition, the Bell Company claimed they were "up to date" here, and resisted improvements desired by the city.

Now they are fearful of competition they change their tactics or promise to. They ask, "What do you want," and say "We will be good." Are the people going to be fooled by such eleventh hour repentance. Over 75 per cent. of the cities in the United States, the size of Green Bay, have turned the Bell Company down by granting franchises to Independent telephone companies. These cities are now enjoying the resultant benefits of competition in improved service, lower rates, double and treble the number of people to talk with, the telephone generally within the reach of the masses. With such a record can anyone question that competition is a good thing?

Is the two telephone talk a valid argument?

Were it so, would not the people of Ohio, Indiana, Illinois, the people of all the other States, the people of Wisconsin generally outside of this east shore strip, have found it out seven years ago and would not Independent telephony have been throttled at its birth? Would the Independent movement, a business men's movement, if you please, all over our country, have succeeded as it has, popularized itself as it has, extended as it has, if the two telephone idea and argument was logical? Would an Independent company, composed of reputable business men, of practical experience, of unquestioned personal and financial standing, be hammering at the portals of Green Bay to invest their capital in competition, if such a contention was well founded? It is exploded Bell Company ammunition. It is about all they have. They know better. It appeals to you on first thought without full and impartial consideration. It temporarily deceives the people where competition is not understood, but rebounds as a most disastrous boomerang on the Bell Company after competition gets established and is in operation. Don't, therefore, be deceived. Don't withhold from the Independent telephone movement that credit accorded to them elsewhere. There is nothing for the city or citizens to lose. There is certainly lots to be gained. In your own State—Wisconsin—in the following sixteen cities: Madison, La Crosse, Janesville, Racine, Sheboygan, Superior, Wausau, Merrill, Appleton, Ashland, Baraboo, Beloit, Kenosha, Marshfield, Monroe and Portage, the Independent companies have a total list of 14,700 subscribers as against 6,900 Bell. Besides there are fifty cities and villages of from 1,000 to 5,000 inhabitants that have Independent exchanges only. There are further, over 7,000 Independent farmer subscribers. In the city of Madison the Independent company has over 2,200 subscribers, and also connects with over 1,000 farmers in Dane County, and some 200 toll stations. The Bell Company has about 500 subscribers in Madison. In Racine, the Citizens' Independent Company has over 2,000 subscribers and reaches over 1,000 more in surrounding towns and villages. In Racine 175 citizens are stockholders in the Citizens' Company, and practically the whole citizenship of the city is enthusiastic in praise of and loyal to the Independent company. In the State at large there are some 200 Independent companies, operating 350 exchanges with 35,000 subscribers and over 1,000 toll stations at the present time, and rapidly extending. Does this situation in Wisconsin look as though competition was a harmful thing and the two telephone bugaboo a valid representation? What is true in this State is also true, and more so, in most of the other States, with the Independent movement going steadily forward. The Bell Company poohpoohed and belittled the movement at the start. They can't keep up with it now and will never catch it. The people have thrown off the yoke of Bell oppression and mistreatment. As before stated, over 75 per cent. of the cities in the United States of 20,000, the size of Green Bay, now have Independent telephone companies operating successfully. The cities of Boston, New York, Washington, New Orleans, Milwaukee and San Francisco are the only cities having more than 200,000 population in which telephone competition has not yet been established. Cincinnati recently capitulated, and an Independent company is now building in Chicago. The Independent Consolidated Telephone Company, of Wisconsin, is building its long distance lines to the city limits of Milwaukee, and, backed by the people, will demand entrance to that city, which will soon be granted, despite the efforts of the Bell Company to keep competition out. What is the situaution in Kansas City, the home of the president of the Wisconsin Bell Telephone Company? In Kansas City conditions before competition were similar, and even worse, than in Green Bay, and relief asked for by its citizens was persistently denied. Competition there has changed conditions entirely. The New Home Independent Telephone Company has built three magnificent exchange buildings, is sweeping the city on public patronage, and already connects with more cities and towns over toll lines in western Missouri and eastern Kansas than does the Bell Company. The number of Independent telephones in operation in the towns referred to is 40,231, as against 9,605 Bell telephones.

In the State of Kansas, in which the Missouri and Kansas Bell Company operates, the number of Independent telephones now in service exceeds 50,000, while the Bell Company has less than 9,000.

ITS HOLLOWNESS EXPLAINED.

Appended to this address to the public are a number of letters from cities that enjoy telephone competition. They round out the case for the Independents. We reproduce two of these letters herewith, one from the Mayor and the other from the leading banker of Madison, Wis.:

"MADISON, Wis., Aug. 8, 1904.

"The effect of competition between the Bell and the local company has been very beneficial to our citizens by reducing rates and increasing the number of subscribers, because of reduced rates, and the local Independent company has so large a number of subscribers that the public, as a whole, do not find it necessary to take both telephones.

"L. S. HANKS,
"President the State Bank."

"MADISON, Wis., Aug. 2, 1904.

"The Bell Company don't cut very much of a figure in the local service. In fact, I do not think the Bell telephone is used in very many private residences. It is true the Bell is used in some of the larger stores, and they have recently made quite an effort to increase their patronage, but so far as I can learn they have not been very successful in this. The Dane County Independent system seems to give universal satisfaction, and I do think competition has increased the number of subscribers.

"W. D. CURTIS,
"Mayor."

In the face of testimany such as this, the Bell Company ought to find it difficult to shut out competition.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

NEED NOT CUT WIRES.

THE city ordinance requiring the Duluth Telephone Company to cut its wires to provide passageway for the removal of a building has been declared unconstitutional in a decision on law points rendered by Judge Windom at Duluth, Minn., and Manager C. M. Mauseau, who had been arrested for failure to comply with the provisions of the ordinance was discharged.

Mr. Mauseau was twice ordered by the city council to open the company's wires on East Third street. Notice was served on the company to that effect, but Mr. Mauseau refused to comply and was arrested.

Declining to enter a plea, Mr. Mauseau filed a demurrer, charging that both ordinances under which the action was brought and the council resolution ordering it enforced were unconstitutional. In the demurrer the defendant maintained that the ordinance was invalid because the title did not suggest its provisions, and that the title and body of the law did not agree. Judge Windom sustained the demurrer.

INSPECTION OF TELEPHONE POLES.

IN an action by a lineman against a telephone company, by which he was employed, to recover for an injury received by the breaking and falling of a decayed pole of chestnut wood, on which he was to place a cross-arm, it appeared that he had worked at such employment for less than a year, and only in defendant's service, and that the line on which he was working was an old one, the poles having been set for eleven years. There was evidence tending to show that plaintiff had not been warned of the danger or instructed to inspect the poles before climbing them, and that he was preceeded by the foreman and another whose duty it was, under the rules of the company, to make the inspection, but that they did not do so. The court held that a positive duty rested on the defendant company, both to warn the lineman and to require an inspection. The evidence being in conflict as to the performance of such duties, the court decided that both questions were properly submitted to the jury. The foreman was held to be not a fellow-servant of the lineman in regard to the inspection, but a vice-principal, representing the company. The company could not escape the obligation by delegating the duty to the foreman or to any one else, and was, therefore, liable to the plaintiff for his injuries. Cumberland Telep. & Teleg. Co. vs. Bills, 128 Fed., 272.

WAR REVENUE ACT.

THE New York Telephone Company has failed in its attempt to recover from the collector of internal revenue certain amounts that it paid on its telephone business under the War Revenue Act of June 13, 1898. During the period for which the taxes were collected, there were in existence in the city of New York contracts for limited telephone services, made by the plaintiff with its subscribers, by which it agreed to transmit a given number of messages for a stated sum which averaged 15 cents per message; for instance, when the number of messages was limited to 600, the price paid was 10 cents for each message in excess of 600. The tax imposed was one cent for each message for which a charge of 15 cents or more was made. The amount for which the company sued was $21,492.75, and interest.

The company contended that the plaintiff could have so drawn the contract as to avoid the payment of the tax, that the law was intended to cover only messages sent from a public pay station, and argued that the private installation, directory listings, and other advantages, distinguished the messages upon which the taxes were paid from those intended to be covered by the law. The contracts define a local message as follows: "A local message is a personal communication, five minutes or less in duration, from said station to another station connected with an exchange of the company in said borough." The court said that the contract was perfectly plain, that there was no ambiguity nor necessity for interpretation, nor room for construction. If the contracts under discussion had been drawn for the express purpose of bringing them within the terms of the act, language more apt could scarcely have been selected. The court considered that the privileges accorded the subscriber were only the necessary ingredients of an agreement to transmit the 600 messages. About the act the court found nothing ambiguous, and would not consent to take into consideration the legislative intent in order properly to interpret the enactment. "What the law-makers intended to do is immaterial when what they actually did do is free from doubt." New York Tel. Co. vs. Treat, 130 Fed., 340.

NUMEROUS 5-CENT JUDGMENTS.

THE justice courts of Chicago still continue to render judgments against the Chicago Telephone Company for the nickels dropped in the slots of the toll stations in cases where connection with the party called is not secured. Constable John Small recently won his third 5-cent judgment against the Chicago Telephone Company. He told the justice that he dropped a nickel in the slot and the operator disconnected immediately after he began the conversation. Costs were $4.65.

CONDEMNING MINERAL LAND.

THE Supreme Court of Kansas has given an instructive decision in a condemnation case brought to take land for a railroad right of way. An appeal was taken from the award of commissioners in the assessment of damages. The complaint was that the theory of the trial court, in presenting the issue, to-wit, the amount of damage suffered by the owner of the land by reason of the taking as presented to the jury by the instructions, was misconceived, or at least not fully and fairly presented. The bill of particulars alleged that the land sought to be appropriated was used for mining purposes and the evidence clearly and without contradiction showed that practically its entire value consisted in the minerals lying within 100 feet or more beneath the surface. The evidence presented the issue whether these minerals might not, to a large extent, be removed from underneath the right of way without interfering with the right of the company to use it as such right of way. The theory upon which the trial court proceeded was that the permanent taking of the right of way for the railroad practically amounted to a complete and permanent deprivation of all the rights of the plaintiff therein and of the beneficiary use thereof.

Commenting upon this theory the court said that it was ordinarily the correct one, or so closely approaching it that its adoption was not material error, because ordinarily the beneficial use of land is found solely in the surface thereof. The more correct rule is, "the measure of damage caused by the appropriation of a right of way of a railroad is the difference in the value before the appropriation and immediately thereafter." This rule is open to the consideration of the jury, all of the elements remaining with the fee going in mitigation. In the present case the railroad company obtained no right to remove any of the subjacent minerals. They all remained the property of the owner of the fee. The railroad company obtained the right to surface support. The owner of the fee, therefore, might not remove any of the subjacent strata necessary thereto, but, subject to this right of surface support, might remove all of such subjacent matter.

The court's instruction was therefore erroneous, because the jury estimated the damages as though the railroad company was becoming the absolute owner of the right of way and everything beneath it. Mo. K. & N. W. R. Co. vs. Schmuck (Ka.) 76 Pac., 836.

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IN THE OPERATING FIELD.

GOVERNMENT TO OWN TELEPHONE PLANT.

AS a result of a Cabinet meeting held recently, Secretary Morton, of the Navy Department, will immediately commence an investigation as to the advisability of the government installing an Independent telephone system connecting all the departments and bureaus of the Federal establishment. It has been suggested that the project, if carried through, may ultimately extend the proposed service to the citizens of the District. The whole question, however, is in abeyance, and no action will be taken upon it until after the Secretary of the Navy makes his report. He will receive recommendations from the various heads of departments and an opinion from the Attorney General as to the laws relating to the subject before he decides upon what course he will advise in the matter. Mr. Morton declined to discuss the subject after the Cabinet meeting, preferring to wait until he would have had an opportunity to look into the situation carefully.

The instructions to Secretary Morton to examine into the question of establishing an Independent system by the government were brought about by a discussion at the Cabinet meeting of the proposed new schedule of rates submitted by the Chesapeake and Potomac Telephone Co. for the coming year. Some of the officials of the departments consider the rates out of proportion to the service.

ORANGE AND SUSSEX INDEPENDENT TELEPHONE MEETING.

THE quarterly meeting of the Orange and Sussex (N. Y.) Independent Telephone Company was held at Washingtonville recently. Those present from the Orange County Telephone Company, of this city, were A. B. Wilbur, M. B. Wolf, W. C. Ramsdell and John McWilliams.

The other companies represented were the Colonial of Newburgh, the Highland of Washingtonville, the Warwick Valley of Warwick, and the Farmers' Union of Sussex.

Most encouraging reports were made concerning telephone matters, showing that the various companies were enjoying a large degree of prosperity.

There were various discussions regarding toll rates and points for increasing the efficiency of the service.

The next meeting will be held at Port Jervis on November 3.

INTERSTATE APPLIES FOR FRANCHISE IN OMAHA.

APPLICATION has been made to the city council of Omaha, Neb., for a twenty-five-year telephone franchise by the representatives of the Interstate Telephone Company, of Dubuque, Iowa. The applicants guarantee a system of at least 2,500 subscribers with a monthly rate of $3 for business and $1.75 for residences on individual lines. Copper metallic circuits will be installed and the city is offered a royalty of three per cent. on the company's gross receipts. The company's lines at present extend across Iowa to the neighborhood of Council Bluffs, and provided the Omaha franchise is obtained application will be made for a franchise in Council Bluffs.

HANAMO TELEGRAPH AND TELEPHONE COMPANY ISSUES A HAND-BOOK.

THE Hanamo Telegraph and Telephone Company, which operates a system of toll lines in Northwestern Missouri, has issued a hand-book describing its system from both financial and telephonic standpoints. This company holds contracts for toll line service with the Home Telephone Company, of Kansas City, which operates exchanges in Kansas City, Mo., and Kansas City, Kan., having a capacity for 10,000 subscribers; Leavenworth, Kan.; Topeka, Kan.; Springfield, Mo.; Joplin, Mo.; Fort Scott, Kan., and Lincoln, Neb., and by means of its contracts with these exchanges it has connection with St. Louis, Mo., where there is an exchange of 20,000-line capacity.

It is also privileged by means of these contracts to extend its lines and make connections with Omaha, Neb.; Sioux City, Iowa; St. Paul and Minneapolis, and all points west, including Chicago.

The purpose of this company, as set forth in the hand-book, is to furnish toll line connections for all Independent companies that may wish them, including the so-called farmers' lines or mutual companies.

The financial part of the book is devoted to the extent of the territory the company can cover from which to draw its income, and also to the high grade of construction which it has so far installed and will continue to do. The company's charter is given in full, together with a copy of the revised statutes of the United States dealing with telegraphs.

WILL MADE BY TELEPHONE.

THE will of Charon Briggs, of St. Louis, Mo., which was made by telephone, was filed in the Probate Court recently.

The instrument was made over telephone for the reason that the testator was confined in the St. Clair contagion hospital with small-pox. Two days prior to Briggs' s death he expressed a desire to make his will. Dr. A. L. Reuss, the county physician, suggested that Briggs telephone his wishes to Mrs. Eliza Hill, the matron of the county farm, and have her take them down in writing and attested by the attendant at the hospital.

THE TELEPHONE ON THE FARM.

AS an illustration of the value that is placed upon the telephone by the farming communities of the Central States, the following incident may be of interest: A farmer who had a telephone connection with the local telephone company of Norwalk, Ohio, wished to purchase another farm a mile or so distant. Before doing so he called upon the manager of the telephone company to find out how soon a telephone could be installed at the farm house he wished to buy. When told not before a year he decided to wait rather than do without the telephone service.

Another farmer in the same locality, wishing to sell his property, made special note in the advertisement that there was "splendid telephone service in the house." Incident to these remarks it might be stated that the service furnished is common battery, with selective ringing.

MUST AMEND ITS COMPLAINT.

THE demurrer of the defendants in the suit of the Rocky Mountain Bell Telephone Company against the Utah Independent Company for an alleged infringement of the copyright law in using the telephone numbers adopted by the plaintiff was sustained by Judge Hall recently on the ground that the complaint did not set forth what loss would result to the plaintiff in case the Utah Independent Company did use its telephone numbers. The court granted the Bell Telephone Company ten days in which to amend its complaint.

A PROGRESSIVE NEW YORK COMPANY.

THE Wayne-Monroe Telephone Company, which was organized in September, 1903, is one of the most progressive companies in New York State. The company began operations with sixty subscribers in the town of Walworth. The line was then extended to Ontario, where it now has sixty-five telephones. Later the system took in the towns of Williamson, with one hundred and six subscribers, and Macedon, with

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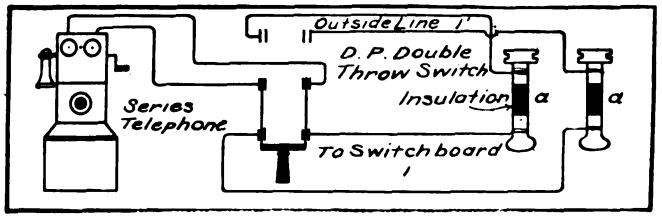
eighty. At present the company is extending the system to Sodus, where is has already secured contracts for one hundred and thirty telephones; Wolcott, Red Creek, Fair Haven, and from Williamson to Palmyra by way of Marion, which will give the system connections with Buffalo, by way of Rochester.

AN EASILY-MADE TEST SET.

By A. L. DeRonde.

IN making tests to determine the nature of trouble and also its location it is necessary that there shall be some means employed to separate the exchange circuits from the line. In general this division of circuits is made at the main distributing frame at the side directly connected to the cable head of the outgoing lines. Usually some sort of a jack is provided which can be inserted between the connecting springs in place of the heat coils, the leads from this test jack being connected with the testing apparatus. Some time ago I was connected with a company that had installed a new heat coil arrester frame. Since no test plug was provided, I devised the following arrangement, the description of which may be of interest to others:

Referring to the Figure, *a a'* are two heat coils, from which the wire and fiber sleeves have been removed, *b b'* are two pieces of twisted electric light cord, one pair being connected to the line side of the coils, the other to the switchboard



side. On a wall is mounted a series telephone and alongside of this is a double-pole double-throw switch. The telephone was connected to the center of the switch as shown in the illustration, and the leads from the heat coils connected to the outside springs, the switchboard terminal of the heat coils to one side and the line terminals to the other. In using this device remove the regular heat coils and insert the test ones in their place; then, by throwing the switch to close the line terminals, the outside circuit can be tested, and by closing the telephone to the switchboard leads the exchange circuits can be tested.

In locating trouble this method is far superior to bridging a telephone across the line because the locality of the trouble can be determined at once and thus a great deal of time can be saved. The description given is to show the application of this method of detail, but it is evident that the construction can be changed to meet different conditions and that the use of a specially designed jack may be employed in the place of the dummy heat coils.

INDEPENDENT IN PREFERENCE TO BELL.

THE stockholders of the Sangamo Valley Telephone Company held a meeting at Williamsville, Ill., recently to determine whether they would connect their system for long distance business with the Central Union Telephone Company.

C. H. Rottger, representing the Bell Company, and F. W. Kelley, representing the Interstate Company, were present, and each addressed the meeting in behalf of their respective companies, and by over a two-thirds vote the Sangamo Valley Company decided to connect with the Interstate Company. The Sangamo Valley Company is operating at this time nearly 100 telephones and is extending its lines and adding more telephones all the time, and will be a valuable addition to the Interstate's large list of toll connections.

SOME MICHIGAN FACTS.

THE value of the Independent telephone system in the State of Michigan is well illustrated in the case of the village of Alma. Before the Union Company started in business Alma had less than twenty-five telephones; the rates charged were $48 for business houses and $36 for residences per year. Since the advent of the Union Telephone Company upward of 300 subscribers have been secured for its system and the rates reduced to less than one-half. The toll line service of the Union company is in almost every respect far superior to the Bell, at the same time the charges are much less, notwithstanding the fact that the Bell Company has reduced its rates to compete with its Independent rival. This large development has also been equalled in every town where the Union Company has established a system, and to-day a subscriber to an Independent exchange can communicate with over 1,000 towns and cities and over 60,000 subscribers in the State of Michigan.

SOUTHEASTERN KANSAS ASSOCIATION MEETING.

THE members of the Southeast Kansas Telephone Association, comprising Chautauqua, Wilson, Montgomery, Neosho, Labette, Crawford and Cherokee counties, in Kansas and Indian Territory, held the second convention of the organization at Joplin, Mo. The adjustment of the toll line service rates and difficulties associated with this department of the business was the chief business transacted.

The officers of the organization are: President, G. H. Spangler, Chetopa; vice-president, E. W. Dow, Baxter Springs; secretary and treasurer, M. L. Robeson; executive committee, W. M. Stetson Cherryvile; A. Dudley.

The meeting was a representative gathering of all the leading men in this section of the States. Those in attendance were: E. W. Dow, Baxter Springs; G. H. Spangler, Chetopa; Fred H. Brown, Parsons; John Rings, Oswego; Harry Farris, Chicago; P. J. Sheppard, Chicago; G. W. Cooper, St. Louis; J. K. Williams, Galena; L. C. Adams, Cedarville; M. Robeson, Galena; James A. Patmor, Kansas City; M. L. Robeson, Galena.

The principal business of adjusting rates on the long distance lines was discussed at length. It seems a double rate has existed and the meeting yesterday was for the purpose of making rates equitable and harmonious throughout this section of the State and Indian Territory. The operators have agreed on most of the points of difference and all matters were settled yesterday.

TELEPHONE SYSTEM FOR TORONTO.

THE city of Toronto will receive sealed offers up to noon on Saturday, October 1st, for the installation and operation of a telephone system in the city upon terms and conditions which may be obtained from the City Clerk, City Hall, Toronto. All bids must be accompanied by a cash deposit or marked check for the sum of $5,000 and made payable to the order of the City Treasurer. This deposit is required to guarantee to the city the fulfilment of the accepted bid of any party, in accordance with the contracts and terms of the specifications. Those desiring to submit bids should address them to the Mayor, Thomas Urquhart, who is chairman of the board of control. To be certain that the bids have been delivered they should be sent registered. It should be understood by all parties participating in this matter that the city does not bind itself to accept any tender.

INDEPENDENT FRANCHISE GRANTED IN ASBURY PARK, N. J.

E. H. SNEDEKER, late general manager of the New York & Long Island Telephone Company, has secured a franchise for an Independent plant at Asbury Park, N. J. Several other applications had been brought before the board of freeholders, but without success, the reason being that two systems were unnnecessary. After a hard fight extending over two months, during which time a petition signed by 239 out of the 250 Bell subscribers for an Independent company was presented to the mayor and city officials as evidence of the necessity of a competing company, the franchise was granted. The conditions imposed are that a system shall be installed and in working order within ninety days, and that a tax shall be paid for the franchise. It is expected that the new system will start with 300 subscribers.

Mr. Snedeker has also applied for franchises to operate competing systems in Long Branch, Ocean Grove and Neptune township.

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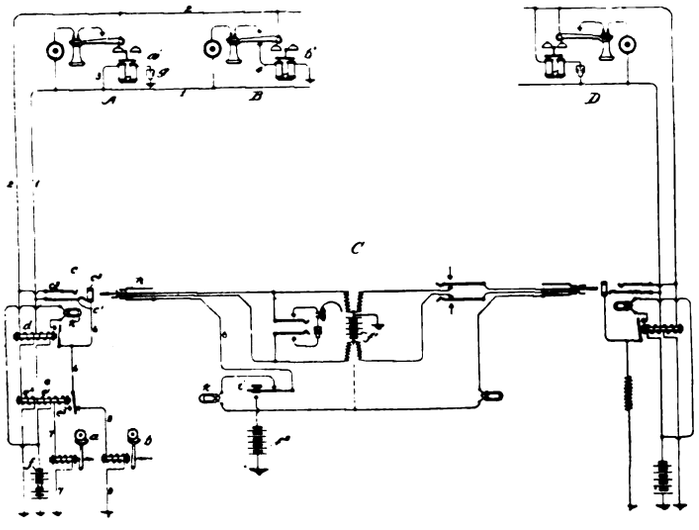
TELEPHONE PATENTS

MEASURED SERVICE SYSTEM FOR PARTY-LINES.

James L. McQuarrie, Chicago, Ill. Patents No. 766,192, and assigns to Western Electric Company, Chicago, Ill. An Improved Switchboard Circuit for Measured Service.

This invention is shown in the accompanying illustration, and is designed particularly to operate in connection with party lines to provide a service meter so arranged that the calls from the different stations upon a party line may be separately registered and thus properly charged.

Each sub-station of the party line is provided with usual telephone apparatus in a bridge being normally open at the contacts



of the usual telephone switch hook. A call bell for receiving signals is provided at each station. Call bell *a'*, at station *A*, is included branch *3* to ground or other return conductor from limb *1* of line, and the bell *b'*, at station *B*, is included in branch *4* to ground from the other limb, *2*, of the line. The branch, *3*, at station *A*, is always open as to direct currents by condenser, *g*; this condenser is adapted to permit passage of alternating or pulsating currents. There is no condenser in ground branch, *4*, at sub-station *B*, but this branch is controlled by the lower contact of telephone switch hook, so that when receiving telephone is taken from its hook the circuit of branch *4* is opened. These call bells are of high impedance to prevent shunting of telephone currents; but resistance of bell *b'* is so proportioned to resistance of windings e^1 and e^2 of relay *e* at the central office that when bridge at station *A* is closed by telephone switch, sufficient current will be shunted from winding e^2 through the branch *4* at sub-station *B* to unbalance the relay *e* and cause same to attract its armature.

When telephone at substation is in use ground branch *4* is opened, and the flow of battery current is substantially equal in both windings *e* and e^3 of relay *e*, so that the magnetic effects of said windings balance one another, and the armature of relay remains unattracted.

Besides line springs c' c^2, spring jack of party line has a third contact or test ring, c^3, adapted to register with third contact or sleeve of a plug which may be inserted in the jack, whereby local circuit *6* of central battery *f'* in the plug circuit may be completed. Circuit *6* has two branches, *7* and *8*, controlled by differential relay *e*. Normally the circuit of branch *8* is closed through the armature-switch lever and normal resting contact of relay *e*; when relay draws up its armature it breaks the circuit of branch *8* and closes branch *7* in its alternate contacts. A responsive device, such as connection counter, may be included in each of the branches, *7* and *8*; a switch provided for local circuit *6*, which terminates in third contact of answering plug *h* for changing electrical condition of circuit to actuate such responsive devices which may have been brought into operative relation to the circuit.

Responsive devices are illustrated diagrammatically as toll counters or connection registers adapted to effect registration upon each current impulse of suitable strength. The device for operating the responsive devices is a switch or push-button, *i*, connected with plug circuit, adapted when depressed to apply to the circuit an impulse of current from battery *f'* stronger than that which is normally applied to circuit from battery *f'*.

The removing of received at either sub-stations *A* and *B* determines which of the connection registers, *a* or *b*, shall be brought into operative relation to circuit *6*, and register thus selected is then operated when key *i* is depressed.

AUXILIARY APPARATUS FOR TELEPHONE SYSTEMS.

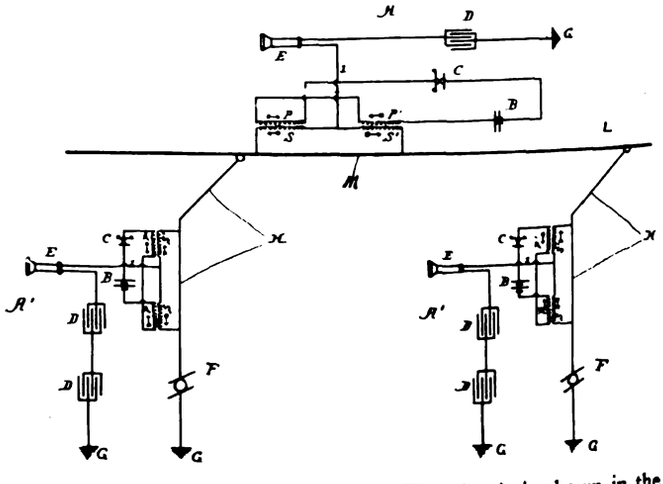
William W. Dean, of Chicago, Ill., assignor to Walter S. McFarlan, of Washington, D. C., patents (No. 765,768). It is well known that the ordinary telephone lines are idle for a very large proportion of each day, and thus a notable fraction of the capital invested in a telephone installation is out of service for a great proportion of the time. Mr. Dean considers that it may be feasible to so arrange a telephone line that it may be used for other purposes than simply that of conversation. So he provides in connection with the distributing frame an auxiliary rack on which an additional set of terminals is placed to which other apparatus can be attached without disturbing or interfering in any way with the function of the telephone lines.

SUBSTATION SWITCH.

William Merriman Kelly and Geary Eldridge Truxell, of Greensburg, Pa., patent (No. 767,284). This patent relates to a novel design for switching contacts at substations. Upon the ordinary hook switch of the substation set, the inventors mount a box. The ringing contacts are placed at one end of this box and the talking contacts at the other end. At the bottom of the box, a small portion of mercury is placed. When the receiver is on the hook switch, and the lever thereby depressed, the mercury flows to the front end of the box and closes contact between the ringing terminals. When the receiver is removed, the hook switch rises, the box is tilted and the mercury flows to the other end opening the ringing circuit and closing the talking circuit.

TELEPHONY

Isidor Kitsee, of Philadelphia, Pa., patents (No. 766,502). The intention of this invention is to provide a means whereby telephone messages can be sent to and from a moving car, either from



a fixed station or from another car. The circuit is shown in the accompanying illustration in which *M* is supposed to be trolley wire of an electric car, *F* a car motor. The inventor provides a

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special induction coil in which the primaries and secondaries are wound in two parts. As is shown the secondaries *S* and *S'* are connected in series and form a shunt to the conductor from the trolley wire to the motor, while the primaries *P* and *P'* are connected in opposition through the battery *B* and the transmitter *C*. The receiver *E* is bridged from the center of the secondaries through two condensers *D D* to ground. The inventor states that with this arrangement of circuit his experiments show that it is feasible to transmit telephone messages by means of a trolley wire between two cars or between a car and a station without sensible interference from the electric current which is used to propel the car.

TELEPHONE TRANSMITTER.

Auguste Gamache, of East Clifton, Canada, patents (No. 766,821). The object of this invention is to provide an improved and more powerful transmitter. A section of the instrument is shown in Fig. 3 while the circuit is shown in Fig. 5. From Fig. 1 it will be perceived that the transmitter is constructed in the usual manner, excepting so far as the capsule is concerned, which contains the granular carbon. Referring to Fig. 5, it will be seen that the induction coil consists of two primaries *84* and *81*. From battery *82* a wire runs to terminal *1*. Just beyond this point the circuit splits, one conductor going to the point *90*, thence through primary *84* to the terminal *91*, thence to the rear

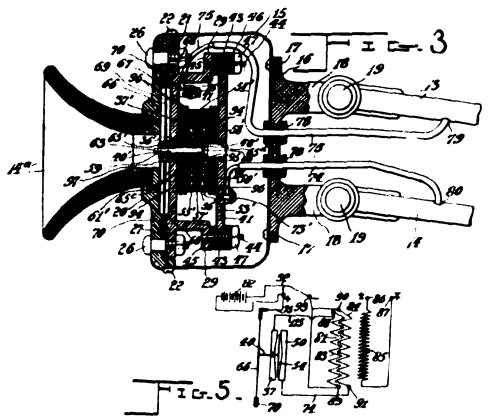


FIG. 5.

electrode *50*; also there is another conductor to the terminal *89*, thence through the other primaries to the terminal *88* and thence to the other electrode *37*. Both of these electrodes are stationary. To the diaphragm *66* a plate *54* is attached. By means of the support of *40*, this plate is placed between the two electrodes *37* and *50*. As the diaphragm vibrates, it alternately compresses and releases the carbon granules which are included between the plate *54* and the two electrodes *37* and *50*. By this means the inventor claims to secure a much more powerful transmitter. The details of construction will be readily understood by referring to Fig. 3, in which similar numerals are employed.

TELEPHONE CENTRAL EXCHANGE INSTALMENT.

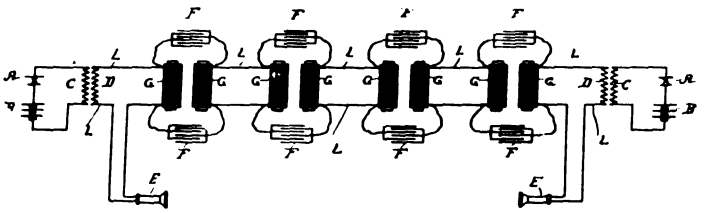
Richard M. Beard, of New York, N. Y., assignor to International District Telephone Co., of New York, N. Y., a corporation of New Jersey, patents (No. 767,033). This invention relates to the maintenance of secrecy upon telephone systems in such a manner as to prevent the operator or other parties from breaking into the circuit when two persons are in conversation. The inventor arranges the jacks in the switchboard in such a manner that the insertion of a plug cuts off all the multiple jacks which are beyond the one in which the plug is introduced. He also arranges the ringing and listening keys in such a manner that the operator is not bridged across the line, but each key is so planned that when it is manipulated, it opens the circuit completely; therefore, if two parties are in conversation and the operator endeavors to listen in she opens the circuit and thus stops conversation.

SELECTIVE TELEPHONE SYSTEM.

Henry Ivins Hawxhurst, of East Oakland, Cal., patents (No. 766,945) a selective telephone system. The object of this invention is to provide a mechanism for signalling individual sub stations without ringing any station but the one desired. The inventor provides an electric magnet whose armature operates a pawl that actuates a toothed wheel. This wheel actuates a second wheel which the inventor terms momentum wheel. As the momentum wheel swings under the impulse from the electro magnet, it is arranged to close a contact that completes the ringing circuit. As it requires a different number of impulses for each station in order to actuate the ratchet wheel and set the momentum wheel swinging, it is possible to individualize the separate stations for ringing.

TELEPHONIC TRANSMISSION.

Isidor Kitsee, of Philadelphia, Pa., patents (No. 766,503). This invention relates to improvements in transmission over long lines and is illustrated in the accompanying illustration in which *A B*



is the local circuit at each end of the line, comprising a transmitter *A*, a battery *B*, and a primary of an induction coil *C*. The line circuit extends between the stations and comprises a receiver *E* at each end of the line in series with the secondary of the induction coil *D*. Further it will be seen that the line is divided into a number of sections *F F F*. Each section is terminated by an electric magnetic coil *G*, which is bridged by a pair of condensers F. By properly proportioning the capacity of the condensers, the inductance of the coils *G* to the length of the sections, the inventor claims improved transmission.

PNEUMATIC TUBE SYSTEM

G. F. Atwood, of Hoboken, N. J., patents (No. 766,213) and assigns to the Western Electric Co., of Chicago, Ill., a pneumatic tube system. The object of this invention is to provide a pneumatic system for the distribution of toll tickets. The general scheme of the invention is illustrated in Figs. 1 and 7. The inventor provides a blower *b*, to which the suction pipe *b* and a blower pipe *b2* are attached. A number of valve boxes *d* are provided, which may be installed either in the main pipe or branches thereof. These valve boxes are so arranged that the

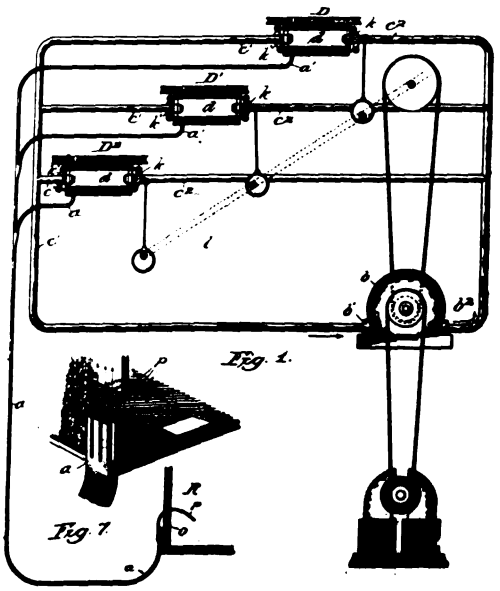


Fig. 1.

Fig. 7.

suction pipe withdraws the air therefrom, while the blower pipe introduces compressed air. Tickets to be transmitted are placed in the box and the valves *k* operated whereby the tickets are blown along through the pipe and delivered upon a receiving desk, as shown in Fig. 7.

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THE WEEK'S MESSAGES

FINANCIAL.

ROCKVILLE, IND.—The Parke County Telephone Company has increased its capital stock to $36,000. Extensive improvements and extensions of lines will now be made and some modern equipment installed. The following directors were elected: A. M. Adams, F. H. Stark, Frank M. Boyd, W. B. Thomson, J. B. Connelly, J. L. Swaim and E. O. Barnes.

PALO, MICH.—The Palo Telephone Company has increased its capital stock from $6,000 to $10,000. The new money will be used in extending rural lines.

GUIDE ROCK, NEB.—The Guide Rock Telephone Company has increased its capital stock to $8,000.

ROCHESTER, N. Y.—The Wayne-Monroe Telephone Company has increased its capital stock from $30,000 to $100,000. The line will be extended for many miles.

DAYTON, OHIO.—The stockholders of the Home Telephone Company have authorized an increase of $200,000 in the preferred stock of the company. The capital stock is now $1,200,000.

LEWISBURG, OHIO.—The Lewisburg Telephone Company has increased its capital stock from $10,000 to $20,000. E. J. Ozias is president.

MONMOUTH, ILL.—The last monthly report of the Monmouth Telephone Company showed gross receipts $1,183.45, with an expenditure for the month of $978.67, which included an item of $300 paid out in bonds. The extensions for the month, included in the above expenses, amounted to $106.45.

MT. BLANCHARD, OHIO.—The People's Telephone Company, of Mt. Blanchard has increased its capital stock from $25,000 to $50,000.

ROCKFORD, ILL.—The directors of the Rockford Telephone Company have decided to put out an issue of 5 per cent. bonds to take up the outstanding 6 per cent. debentures. The company has at present 2,000 lines, which will be increased as rapidly as possible to 4,000, involving an expenditure of between $50,000 and $100,000.

ROCKVILLE, ILL.—The Park County Telephone Company, of which A. M. Adams is president, has increased its capital stock to $36,000.

SODUS, N. Y.—The Wayne-Monroe Telephone Company has increased its capital stock from $30,000 to $100,000. The company has been doing a prosperous business and proposes to use the additional money for extensions.

CLEVELAND, OHIO.—The gross earnings of the Cuyahoga Telephone Company for the month of July were $36,608, expenses $21,986; net, $14,632.

CLEVELAND, OHIO.—The monthly statement of the Lancaster Telephone Company show gross earnings of $1,512; expenses, $952; net earnings, $562; deductions, $222; surplus, $340.

CLEVELAND, OHIO.—The United States Telephone Company reports an increase of gross earnings of about 9 per cent. for June over the same month last year. The statement compares as follows: Gross, 1904, $34,471.07; 1903, $31,693.60. Expenses and taxes, 1904, $22,081.07; 1903, $20,793.12. Net earnings, 1904, $12,390.00; 1903, $10,900.48.

YOUNGSTOWN, OHIO.—The monthly statement of the Youngstown Telephone Company shows gross earnings of $4,295; expenses, $2,295; net earnings, $2,000; deduction, $1,208; surplus, $791.

FRANCHISES.

ALTON, ILL.—A representative of the Fosterburg, Bethalto, Brighton and Wood River Telephone Company has applied for a franchise in this city.

WHITEHALL, ILL.—The Illinois Telephone Company has been granted a five year franchise in this town.

BICKNELL, IND.—George Buck and others, of this place, contemplate organizing a new telephone company, and will ask the county commissioners to grant a franchise.

SO. McALESTER, IND. TER.—The Schooler Brothers have been granted a franchise to operate a common battery telephone system in this city, in competition with the old telephone system.

PARKER, KANS.—The Parker Telephone Company has been granted a franchise and will install a local telephone exchange. It is capitalized at $2,000.

HOUGHTON, MICH.—The city council has granted the Automatic Telephone Company permission to construct a local system.

STARBUCK, MINN.—The White Bear Lake Telephone Company has been granted permission to build a line within the city limits.

LEBANON, N. H.—The Independent Telephone Company, of Lebanon, has asked for a franchise giving them the privilege of establishing telephone service in this place.

PLAINFIELD, N. J.—The Northeastern Telegraph & Telephone Company has paid the Fanwood Township Committee $1,000 for the privilege of stringing its wires through the lower end of the township.

BONHAM, TEX.—The city council has granted a franchise to the Phenix Telephone & Telegraph Company. Twenty-five or thirty telephones will be installed at once.

COMBINATIONS.

BAINBRIDGE, GA.—The Bainbridge Telephane Exchange has been sold by W. W. Collier to a party of local capitalists, who will at once incorporate, improve and extend the system. The construction to be about $15,000.

PITTSFIELD, ILL.—The Farmers' Telephone Company and the directors of that part of the Orr Telephone System south of Griggsville, have made arrangements for the consolidating the two companies.

BRISTOL, IND.—F. H. Hilbush, of Bristol, has become sole owner of the Bristol Telephone Company. No expense will be spared to make the exchange as complete as can be found in many larger localities.

MOULTON, IA.—C. A. Mann has purchased the local telephone exchange. Improvements will be made.

ST. PETER, MINN.—Negotiations are under way for the consolidation of the Nicollet County Telephone Company and the St. Peter Telephone Exchange. The Nicollet County system is valued at $25,000 and it has 125 miles of country line. The St. Peter plant is valued at $35,000 and operates 415 telephones. It is now owned by James Bennett of this place.

HALCOTTSVILLE, N. Y.—The Standard Telephone Company is endeavoring to lease or buy telephone lines in this vicinity.

NEW COMPANY NOTES.

HUNTSVILLE, ALA.—The planters in the neighborhood of Green Grove have organized a mutual telephone company with $2,000 capital.

LAWRENCEVILLE, ILL.—The Star Line Telephone Company, of Lawrenceville, has been incorporated with a capital stock of $100,000 by Henry M. Knipe, I. S. Abbott and A. L. Maxwell.

OCOYA, ILL.—The Eppard's Point Telephone Company has been incorporated with a capital stock of $2,500 by W. E. Fisk, W. W. Osborn, W. Wagner.

INDIANAPOLIS, IND.—The Ekin Mutual Telephone Company has been incorporated with a capital stock of $12,000. The company proposes to establish and operate a telephone exchange and system in Ekin, Tipton and Hamilton Counties. The directors are: W. A. Tippin, William Price and W. F. Small.

WILMOT, IND.—The Wilmot Mutual Telephone Company has been incorporated with a capital of $10,000 to operate telephone exchanges at Cromwell, North Webster and Wilmot, in Noble County. The officers are: H. T. Klein, president; G. S. Banse, vice-president; L. R. Gerard, secretary and treasurer, and A. L. Johnson, manager.

DEFIANCE, IA.—The Defiance Telephone and Electric Light Company has been incorporated with a capital stock of $15,000.

MANNING, IA.—The Manning Telephone Company has been incorporated with a capital stock of $2,500, by W. B. Swaney and others.

CORYDON, KY.—A new telephone system is being built by O. S. Wright which will connect about 300 subscribers with Corydon and Fall City.

RALEIGH, MISS.—The Smith County Telephone Company has been given power to operate in all of the towns and villages of the county. The directors of the company have secured a right-of-way and the work of putting up the lines will be commenced in a few days.

LANSING, N. Y.—The Farm and Village Telephone Company has been incorporated with a capital stock of $20,000, by R. Miller, Rensselaer Miller, of Lansing, N. Y., and Ivan Miller, of Groton, N. Y.

MONTGOMERY, N. Y.—A meeting has been held at this place to take steps for the organization of an Independent telephone company in this village.

DUNDEE, MICH.—The Monroe County Telephone Company, of Dundee, has been incorporated with a capital stock of $15,000.

FREMONT, MICH.—The Dayton Center Telephone Company, of Fremont, has been incorporated with a capital stock of $2,000.

NORVELL, MICH.—The Norvell & Manchester Telephone Company, of Norvell, has been incorporated with a capital stock of $375.

HENDERSON, MINN.—The Henderson Telephone Company has been incorporated with a capital stock of $10,000 by Hans Ems, W. H. Leeman, Lionel A. Guilbert, John F. Dempsey, Phil. J. Hemler, Allois W. Heberle, August Ney, Alfred C. Blasing, and William N. Theissen.

ROTHSAY, MINN.—The Rothsay Telephone Company has been incorporated with a capital stock of $10,000. Work has been begun on the construction of a new line to Lawndale.

ARCADIA, MO.—The Arcadia and Drywood Telephone Company has been incorporated with a capital stock of $750.

MONROE CITY, MO.—The Farmers' and Merchants' Telephone Company has been incorporated with a capital stock of $3,000 by J. H. Gentry, J. Kendrick, F. E. Orr, C. L. Elzea, J. T. Spaulding, T. B. Boulware and others.

SENATOBIA, MISS.—The Tate County Telephone Company has been chartered to do business here. Incorporators: J. F. Brewer, Phil A. Rush, and others.

GREAT FALLS, MONT.—The Cascade County Rural Telephone Company has been incorporated with a capital stock of $5,000. The directors are: Duncan Cameron, Cuno Jaekel, W. F. Kester, John Mainland, C. F. Stork, E. B. Judd and Andrew Thisted.

CHAMPION, NEB.—The Chase County Telephone Company, of Champion, has been incorporated with a capital of $10,000.

ASHEVILLE, N. C.—The Franklin Telephone and Electric Company has been incorporated. The Piedmont Electric Company is interested and can be addressed for information concerning the enterprise.

FRANKLIN, N. C.—The Franklin Telephone & Electric Company has been incorporated with a capital stock of $15,000, by J. S. Trotter, Samuel L. Kelly, of Franklin; J. H. Weaver, and W. M. Farr, of Asheville.

COLUMBUS, OHIO.—The Franklin County Telephone Company, capital stock $150,000, has been incorporated with headquarters in this city. The lines of the company will have their termini in the villages of Westerville, Gahanna, Worthington, Galloway, Groveport, New Albany, Dublin, Hilliards, Lockbourne, Harrisburg, Reynoldsville, Flint, Alton, Amlin, Black Lick, Brice, Central, College, Elmwood, Hayden, Pleasant Corners and Pickerington and Lithopolis in Fairfield County, with branches to Africa and the Girls' Industrial Home in Delaware County. The company in the future will extend the wires to other sections.

HALLSVILLE, OHIO.—The Colerain Telephone Company has been incorporated with a capital stock of $10,000 by P. D. Robinson, A. S. Haag, A. H. Clark, T. P. Sloan and E. A. Reed.

ENID, OKLA.—The Enid Rural Telephone Company has been chartered with a capital stock of $30,000 The incorporators are: J. S. Brooks, J. P. Maddox, and H. G. Horner, all of Enid.

FOSS, OKLA.—The Northwestern Telephone Exchange, of Foss, has been incorporated with a capital stock of $5,000, by S. H. James, Emma James, Etta James and O. H. James.

FREDERICK, OKLA.—The Frederick Telephone Company has been chartered with a capital stock of $5,000. The incorporators are: A. X. Campbell, J. M. Bellamy and W. C. Shaw, all of Lawton.

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ST, STEPHENS, S. C.—The Berkeley Telephone Company, of St. Stephens, has been incorporated with a capital stock of $1,500, by W. A. Floyd, W. R. Russell, G. Rittenberg and W. A. Bunch.

HUNTINGDON, TENN.—The Consolidated Telephone and Telegraph Company has been granted a charter. The incorporators are: J. K. Barlow and J. F. Barlow, of Savannah; T. S. Hughes, of Clifton; F. E. Schwab, of Nashville; H. B. Stubblefield, of Denson's, and W. N. Sloan, of Linden. The capital stock is $50,000. The company will operate lines in Perry, Wayne, Hardin and adjoining counties.

JUNCTION CITY, TEX.—The Junction City Telephone Company has been incorporated with a capital stock of $5,000, by T. B. Phillips, M. E. Blackburn and T. J. Bailey.

TOLUCA, VA.—The Toluca and Fredericksburg Telephone Company has been organized, with Hugh Adie, president; C. A. Bryan, secretary; the Conway Gordan Garnett National Bank, of this city, treasurer; M. K. Lowry, N. B. Musselman, E. S. Moore, R. J. Payne, R. A. Moncure and Wesley Knight, directors. The company will put in a telephone line to run from Toluca by Garrisonville, Stafford Court House, Brooks Station and Boscobel, to Fredericksburg.

WINCHESTER, VA.—Application has been made to the corporation commission for a charter for the Frederick & Shenandoah Telephone Company, with headquarters in this city.

BEE, W. VA.—The Bee Telephone Company has been organized.

HOLLANDALE, WIS.—The Ridgeway, Jonesdale, and Hollandale Telephone Company has been incorporated with a capital stock of $2,000, by Robert Brunker, William Kramer, Thomas Conway, P. A. Peterson, and Even Johnson.

SHAW, WIS.—The Shaw Telephone Company, of Eau Claire County, has been incorporated with a capital stock of $5,000, by Charles Seguire, Ira Ives and Nels M. Johnson.

PERSONAL.

J. W. SMITH, of Washington, Ia., has been appointed manager of the Union Electric Company's exchange at Moline.

MISCELLANEOUS.

DARDANELLE, ARK.—The Arkansas Telephone Company, of this city, has recently completed its connections to Little Rock and Fort Smith and is giving excellent service.

NEW HAVEN, CONN.—Five hundred members of the Telephone Employees Mutual Benefit Society, of Connecticut, enjoyed their eleventh annual reunion at Savin Rock recently.

PALMYRA, MO.—The Big Four Telephone Company held a business meeting here recently to discuss extensions and improvements to the system.

QUINCY, FLA.—The Central Telephone exchange, of this city, was destroyed by fire recently.

BLOOMINGTON, ILL.—Preliminary plans have been formed for the organization of the Central Illinois Independent Telephone Association, and a committee appointed to form plans for a permanent organization.

WATERLOO, IOWA.—The Iowa Telephone Company has secured a site for an exchange building and will take bids for the building at once.

SARANAC, MICH.—The Saranac Telephone Company is making preparations to extend its system in the near future.

WINDOM, MINN.—The Twin City Telephone Company has completed a new line between Mankato and Windom.

ALTON, MO.—The farmers in this vicinity have petitioned the city council for a franchise to operate a telephone system.

LA BELLE, MO.—The new directory of the La Belle Telephone Company shows twice as many subscribers as did the old one.

HIMROD, N. Y.—The route of the Himrod Telephone Company, as now outlined, will include the towns of Dresden, or Geneva, Keuka, and Dundee, and connections with Penn Yan. It is intended to include the territory east of Seneca Lake and also to run the lines to Keuka Lake.

BEATRICE, NEB.—The Home Telephone Company has received five miles of cable, which will be used in extending its system in this city.

FULLERTON, NEB.—The Citizens' Telephone Company has placed in operation a new line to Timber Creek, and also a direct metallic toll line to Palmer.

SALEM, N. J.—The Pine Grove Rural Telephone Company recently organized, has disbanded, and the incorporators have purchased stock in the People's Rural Telephone Company, of Swedesboro.

GLOVERSVILLE, N. Y.—A recent electrical storm badly damaged the toll lines of the Glen Telephone Company.

MARTINS FERRY, O.—Hunter S. Armstrong has been elected president; Geo. H. Walters, vice-president, and Wilmer Steer, secretary, of the Ohio Valley Telephone Company. The system will be generally enlarged and improved.

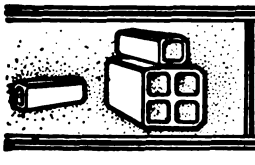
SAWYERVILLE, QUE.—The Canadian Telephone Company held their eighth annual meeting recently. The company operates in the counties of Compton and Lake Megantic. Mr. G. G. Hurd is president, and A. Adam, vice-president.

BROOKINGS, S. D.—The Thompson Caldwell and Wilson Telephone Company has now eleven rural lines in working order.

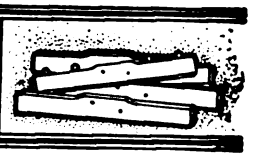
UNDERGROUND.

SPRINGFIELD, ILL.—An ordinance has been introduced into the city council requiring underground construction for telephone and other electrical wires.

MEMPHIS, TENN.—The city authorities are taking steps to enforce strict compliance with the law compelling underground wires in the fire districts. It is stated that the Memphis Telephone Company and the American Telephone and Telegraph Company have not complied with the requirements of the law.



New Construction in the Field



RIFLE, COLO.—The Western Slope Telephone Company is changing its lines from grounded to metallic circuits.

DE LAND, FLA.—The De Land Telephone Company will extend its lines to Beresford.

ALTON, ILL.—It is probable that the Fosterburg, Bethaldo, Brighton & Wood River Telephone Line will be constructed into Alton. A representative of the company applied to the city council for a franchise recently.

ALTON, ILL.—The Kinloch Telephone Company will construct a new toll line from Alton to Jacksonville. It will be ready for operation in the fall.

FOSTERBURG, ILL.—John S. Culp, of this place, is the leading spirit in a new company which will soon be organized to construct rural lines.

HILLSBORO, ILL.—The Montgomery County Telephone Company is making arrangements to install a toll and long distance switchboard.

KANKAKEE, ILL.—The Interstate Telephone Company is rushing work on the extension of its telephone system in this city.

OREGON, ILL.—The Ogle Telephone Company is overhauling its system between here and Rochelle, and also between Mt. Morris, Forreston, and Polo.

DOMESTIC, IND.—Fifteen farmers living near Domestic have organized a company and will construct rural lines connecting their farms. They also intend to make connection with the Independent telephone lines at Domestic.

CEDAR FALLS, IA.—The Iowa Telephone Company will rebuild the local system throughout.

SIOUX CITY, IA.—An agreement has been reached by the Sioux City Telephone Company, the New Yankton Telephone Company, of Yankton, S. D., and the Bruce telephone lines, reaching a number of smaller South Dakota points, and the Ward lines will be connected. New lines will be constructed to Aberdeen, Mitchell, Watertown, Brookings and all the principal towns east of the Missouri River in South Dakota. Connections will also be made with all principal cities in northwestern Iowa.

BOWLING GREEN, KY.—The Home Telephone Company has nearly completed its new line from this city to Scotville.

SMITHLAND, KY.—Citizens of Salem and vicinity will construct an exchange in that town. The People's Independent Telephone Company, of this place, will furnish pole connections. J. P. Roney will probably be manager at Salem.

BIDDEFORD, ME.—The Saco and Biddeford Telephone Company will extend its line.

TAUNTON, MASS.—The Farmers' Telephone Company is building a line from Middleboro to Lakeville.

ALBERT LEA, MINN.—The local telephone company is preparing to reconstruct its system.

CALEDONIA, MINN.—The Standard Telephone Company has decided to replace its present switchboard with a new 250-drop board.

CROOKSTON, MINN.—The farmers of Pleasant View and Green Meadow will construct a line from Ada to Gerry, taking in the intermediate points.

DULUTH, MINN.—The Zenith Telephone Company is engaged in enlarging and improving its plant, involving an expenditure of between $75,000 and $100,000. When the work is completed the company will be in a position to handle a total of 3,500 subscribers, it having at present about 2,500 on its books. A new switchboard is being installed and a complete party line system is also being put in.

NEW LONDON, MINN.—The citizens have organized a telephone company and will install a local exchange.

ST. FRANCIS, MINN.—A telephone line will be constructed from here to Lake George.

WINONA, MINN.—The Winona Telephone Company is installing a new long distance switchboard.

ULEN, MINN.—C. Paulsen will construct a local telephone system.

BILLINGS, MONT.—The Mutual Telephone Company, of this city, will build long distance lines practically covering the western part of Carbon County. The line will start from Red Lodge and take in all the small towns along the Stillwater. It will also be extended into Sweet Grass County as far as Nye.

LINCOLN, NEB.—The Automatic Telephone Company has commenced building a new line to Yankee Hill and Burnham.

BATH, N. B.—The Bath Consolidated Telephone Company, is extending its system by the construction of forty miles of new wire from Kilfoyle Settlement to the border of Northumberland County.

MONCKTON, N. B.—The Kent Electric Company will build new telephone lines from Richibucto to Rexton, Buchtouchi, Kauchibouguac, Harcourt and other points in Kent County. Also along the line of the Kent Northern Railway to Kent Junction.

ST, STEPHEN, N. B.—The New Brunswick Telephone Company is building a new exchange here.

DARIEN, N. Y.—The Darien Telephone Company has connected the Corfu exchange with East Pembroke. Two other lines to Darien, and a third to Alexander are contemplated.

OCEANA, MICH.—The Lake Shore Telephone Company will install an exchange at Pentwater.

GENEVA, N. Y.—The Geneva Telephone Company has connected Flint Creek and Hall's Corners with this exchange. Work is now being pushed on lines south of the City. Several other lines are contemplated and work on reconstruction will be pushed.

MILFORD, N. Y.—A local telephone line is contemplated to connect this village to Oneonta.

OXFORD, N. Y.—The Oxford Valley Telephone Company is constructing a line between Brisben and this place. A line will connect with the Independent line from Norwich controlled by Mr. Marcus. At Brisben the new line will connect with an Independent line to Binghamton. The officers of the new company are George B. Fletcher, president; F. E. Beadle, vice-president, and M. T. Whitney, secretary and treasurer.

BRINSMADE, N. D.—E. F. Edwards will construct a local system.

FREEBORN, N. D.—Citizens residing in the neighborhood of Freeborn and Morris are considering the advisability of building a telephone line to connect with New Rochford.

MARION, OHIO.—The Marion County Telephone Company has decided to immediately build a plant at Waldo. The company has a line from this city to Waldo and will immediately install an exchange at that place, which will serve the surrounding villages, including Ashley and Cardington.

NORWALK, OHIO.—The local telephone company is enlarging its plant and building a new line from the Heights to Milan.

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BOOK NOTICES.

"TELEPHONE PRINCIPLES AND PRACTICE." By George Walker Wilder, Ph. D., Assistant Professor in Electrical Engineering, at the Armour Institute of Technology, Chicago: Cantwell Printing Co., Madison, Wis. 450 pages. 375 illustrations. Price, $2.00, postage paid.

The latest contribution to manuals of telephony is the volume by Professor Wilder. The first six chapters are devoted to an exposition of the fundamental principles of electricity and magnetism, which underlie the construction of all telephone apparatus, and in the course of this matter, Professor Wilder explains the fundamental principles of the subject in a manner to be easily comprehended by non-mathematical students. In Chapter VII. the early forms of telephonic apparatus are described, while Chapters VIII. and IX. take up the modern receiver and transmitter. In Chapter X. the principles of induction are treated, these pages forming an introduction to the succeeding chapters on induction coils, the magneto generator and the magneto bells; then, under the titles of hook switch and instrument circuits, the author describes the various forms of substation apparatus.

The next portion of the book is devoted to exchange systems and switchboard apparatus, in which the various switchboard circuits of both magneto and common battery and the methods adopted for party lines are treated at some length. Following comes a description of the construction of telephone lines, with paragraphs upon poles, wire, and other appliances which are used for the purpose. Finally the book concludes with a chapter giving some estimates upon the cost of line construction. On the whole, a valuable review of the subject is presented, written in a clear and non-technical manner, with a style which is likely to attract the bulk of workers in the telephone field. The illustrations are well chosen to fit the subjects presented, and as a large proportion of them are half tones, they are conspicuous for the pleasing effect which is produced.

We believe that the volume will find a wide and ready market among the thousands of wire chiefs and construction men who are contributing to the rapid growth of telephony in this country, and who with American keenness, are anxious for a wider and more complete knowledge of their business. To these we commend the volume and refer them to page ? ? for additional details.

TRADE NOTES

THE BAIRD MANUFACTURING COMPANY, of 4 Michigan street, Chicago, has shipped three hundred pay stations to Kansas City this month. This is encouraging and looks as though Missouri knew a good thing when they saw it.

THE AUTOMATIC TELEPHONE EQUIPMENT COMPANY, of Boston, Mass., has recently issued a booklet setting forth the advantages of its telephone apparatus. This brochure is tastefully gotten up and contains a large amount of information. To parties interested it will be mailed upon request.

THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, Rochester, N. Y., and Chicago, Ill., has recently closed contracts for switchboards with the following companies: Pfister Vogel Leather Co., Milwaukee, Wis.; Davis & Means, Delmar, Ia.; Fayette County Telephone Co., Fayetteville, Tex.; Shelby Telephone Co., Shelby, Mo.

THE J. W. MIDDLETON COMPANY, 167 Dearborn street, Chicago, Ill., wishes to draw the attention of the telephone field to the fact that it is placed in an exceptionally good position to furnish stock certificates, bonds, records, and all other kinds of printing necessary to the formation of telephone companies. The company will furnish all parties interested samples and prices of the various kinds of work it is its business to do. Special attention is drawn to the high-grade steel and copper plate engraving for stock certificates. The company will be pleased to answer all questions and furnish any further details regarding its business upon request.

THE F. BISSELL COMPANY, of Toledo, Ohio, is making a new type pot-head bracket, which, like its other line of pot-head sleeves and branches, takes the name "Security." The old style of pot-head block is never on hand when wanted; never adjustable; is special, and a lineman must always hunt a piece of lumber and make each block. The lumber is the only cheap thing about it. The method of fastening a wooden block is unsatisfactory. Linemen must stand on something, and these blocks break under their weight. This "Security" blacket is of malleable iron; is easily attached to the pole and is so built that it will stand heavy strain. The blacket clamps firmly on the cable without injury to the cable. The strain is put on the lead sheath and not on the pot-head. Linemen may stand or swing on this bracket without injury to it or themselves. Bracket is made in two sizes to fit any cable.

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FOR SALE CHEAP—Five switchboards of magneto express type, in good condition. Just the thing for small exchanges. Address, Box 225, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 225

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GILDART BROS., Albion, Mich. 168

WANTED—Position by telephone engineer, capable of taking charge of plant and giving good service to subscribers and dividends to stockholders. Address, F. C. Woods, 665 Wells street, Chicago, Ill. 231

I WANT TO LEASE a telephone plant in a live, prosperous city; one that is not earning up to expectations. Can make it pay good interest to owners. I have references and money to back me. Address, Box 219, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 219

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

UP-TO-DATE MANAGER, who has increased plant two and one-half times in two years, contract expires Sept. 1st, would like to change. Adrress Box 216, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 216

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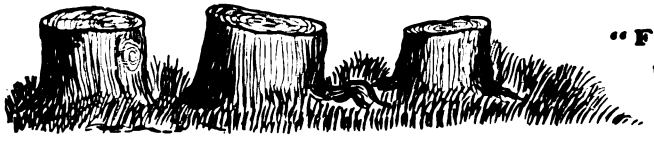
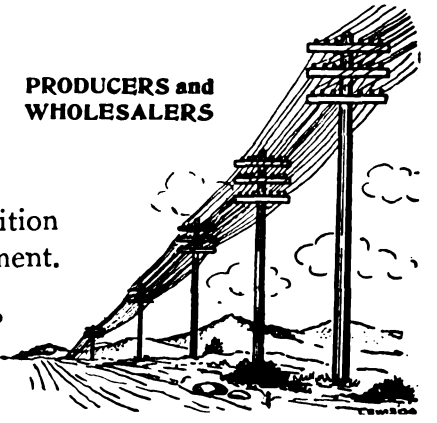


"From the Stump to the Line."



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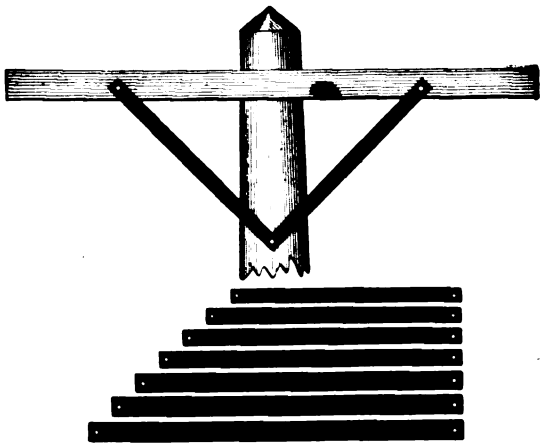

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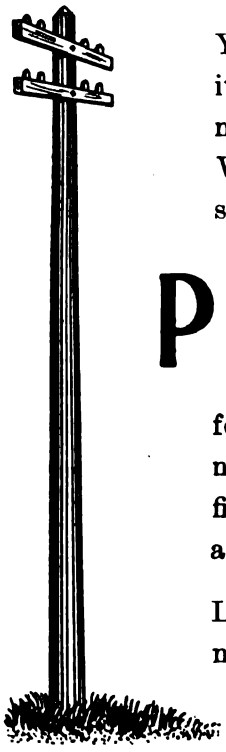

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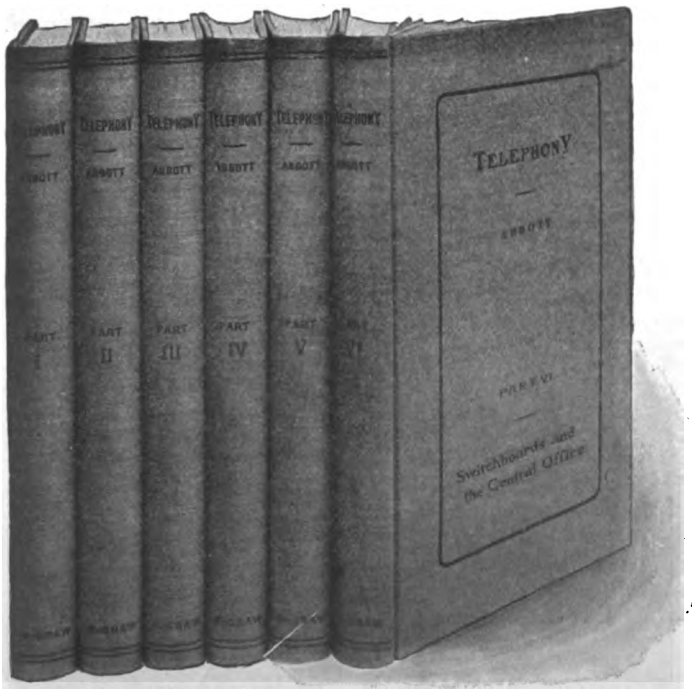

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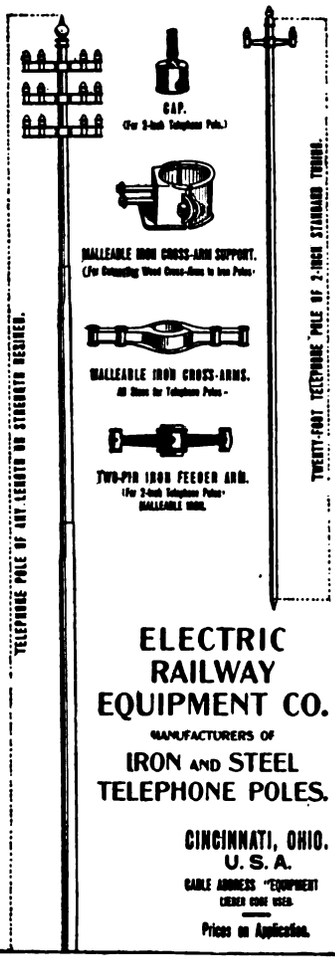

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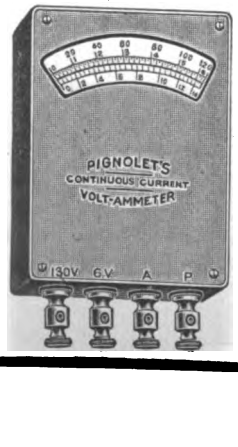

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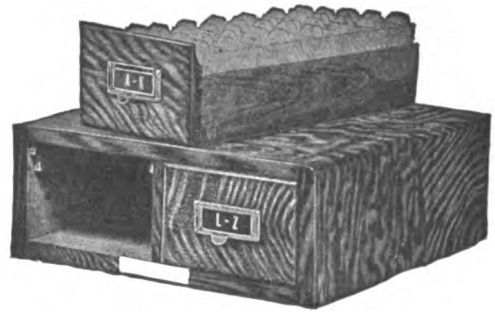

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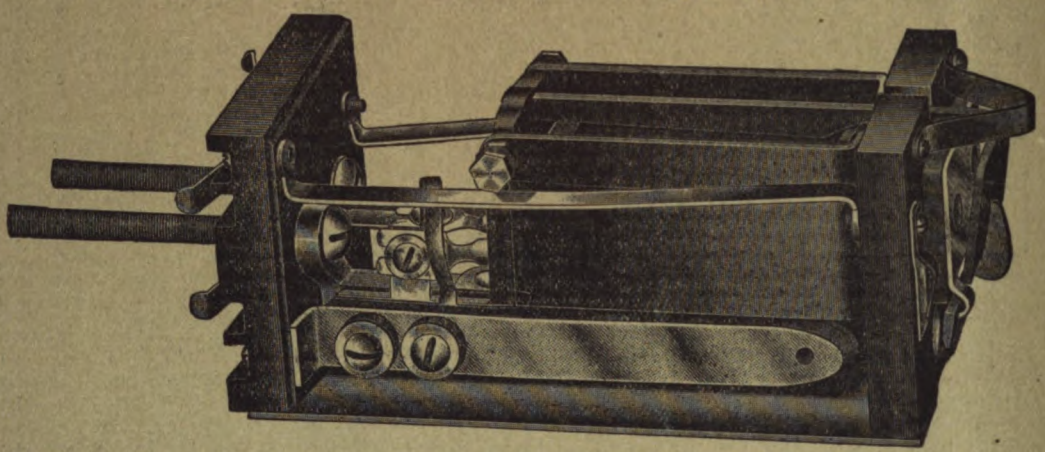

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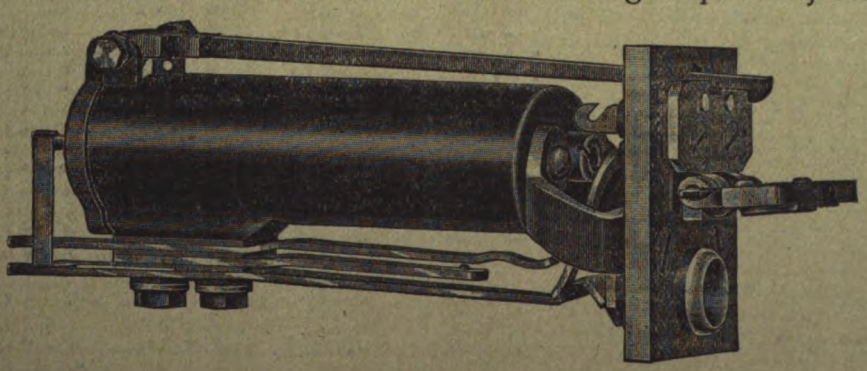

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Vol. 10 NEW YORK—SEPTEMBER 3, 1904—CHICAGO Number 10

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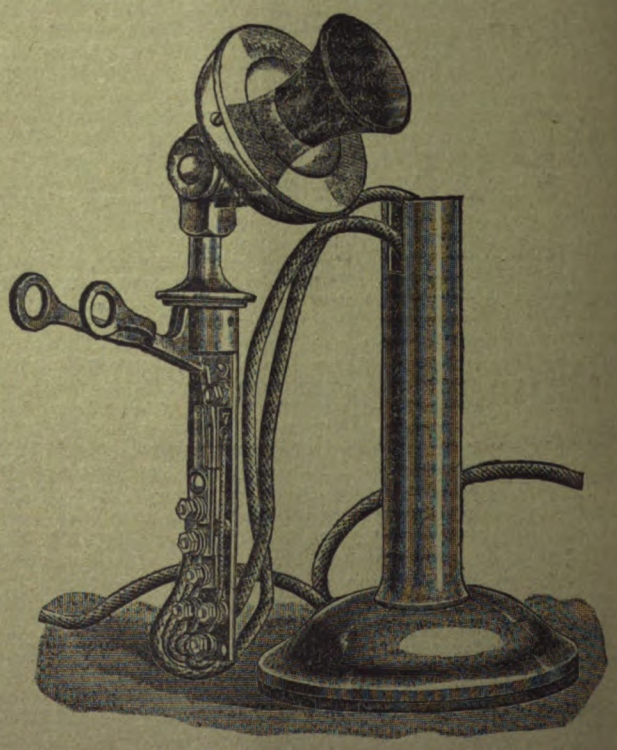

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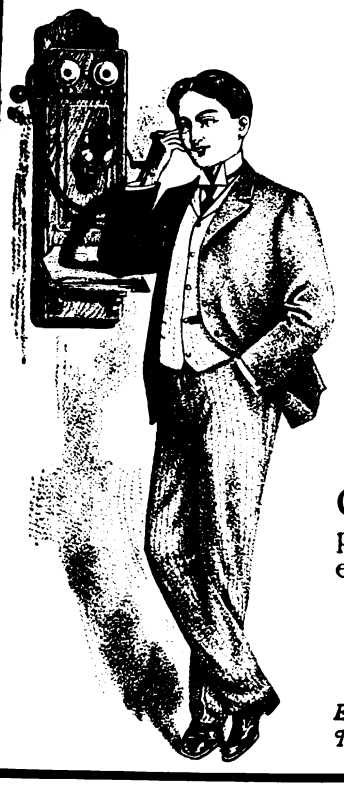

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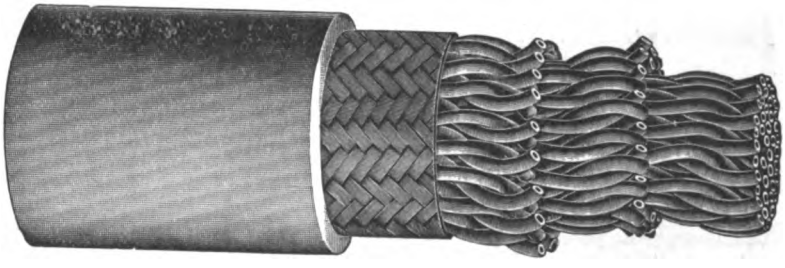

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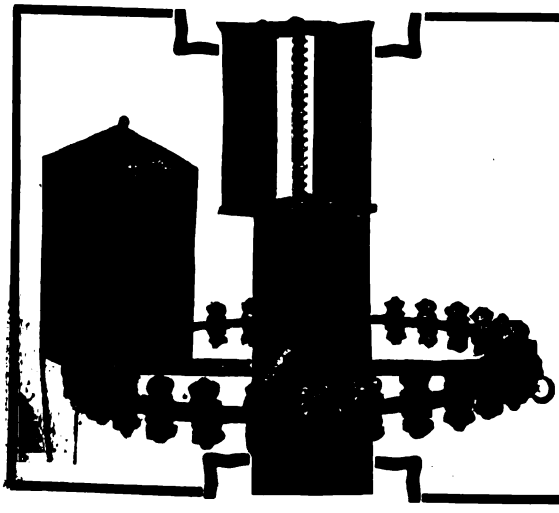

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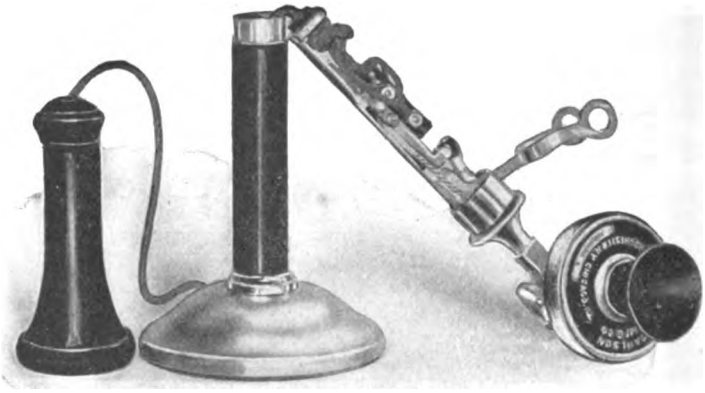

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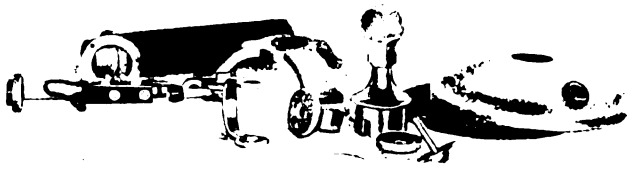

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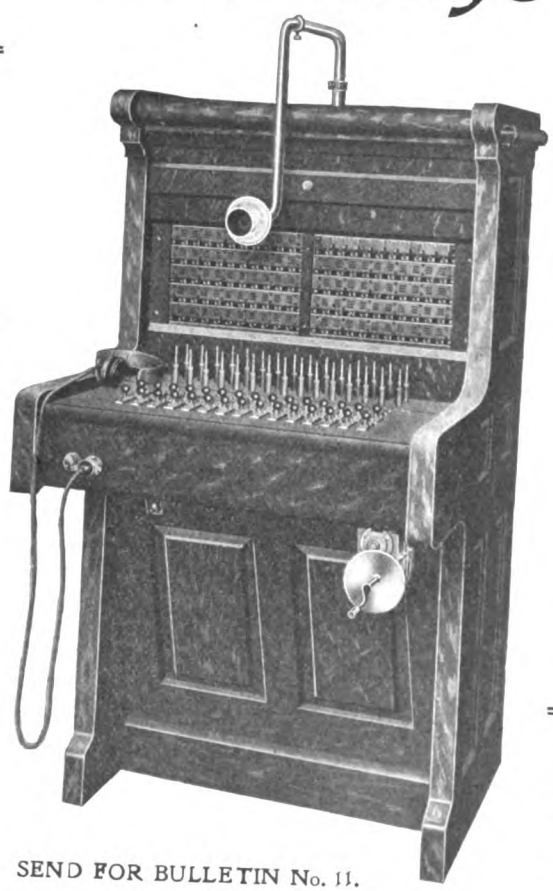

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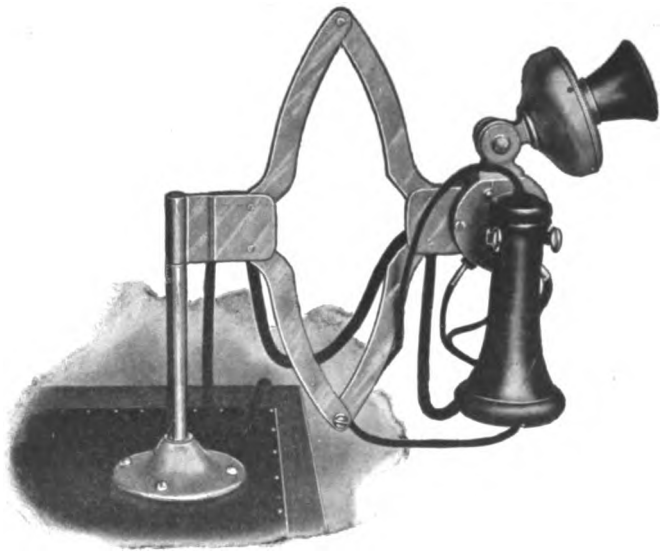

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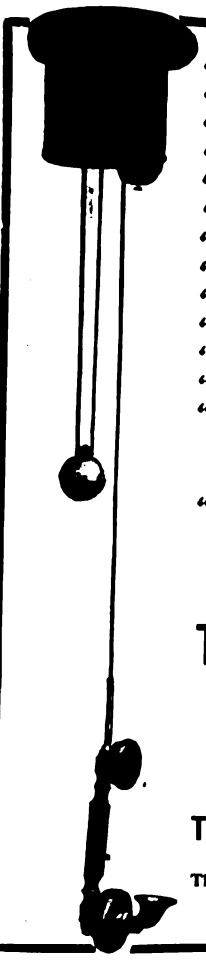

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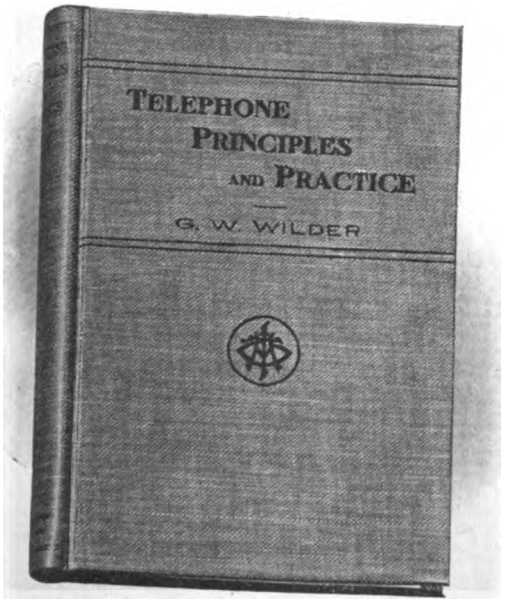

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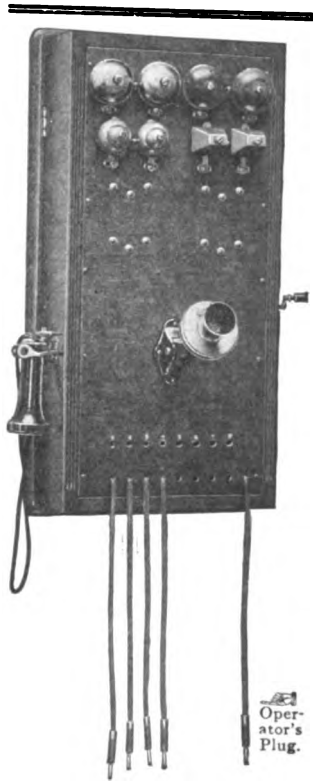

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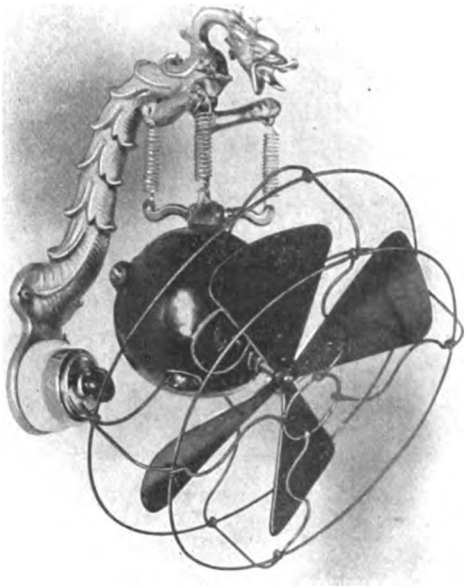

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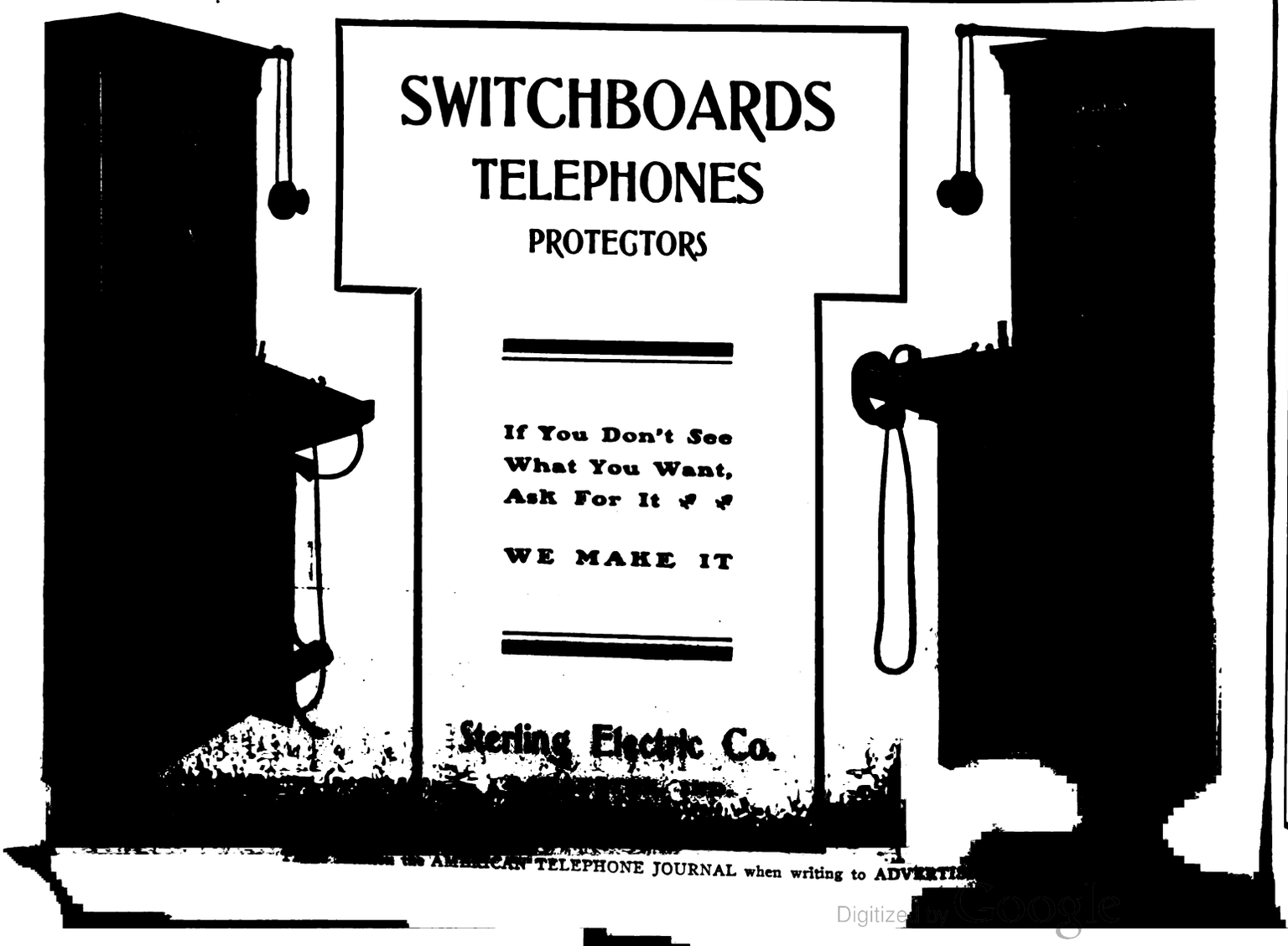

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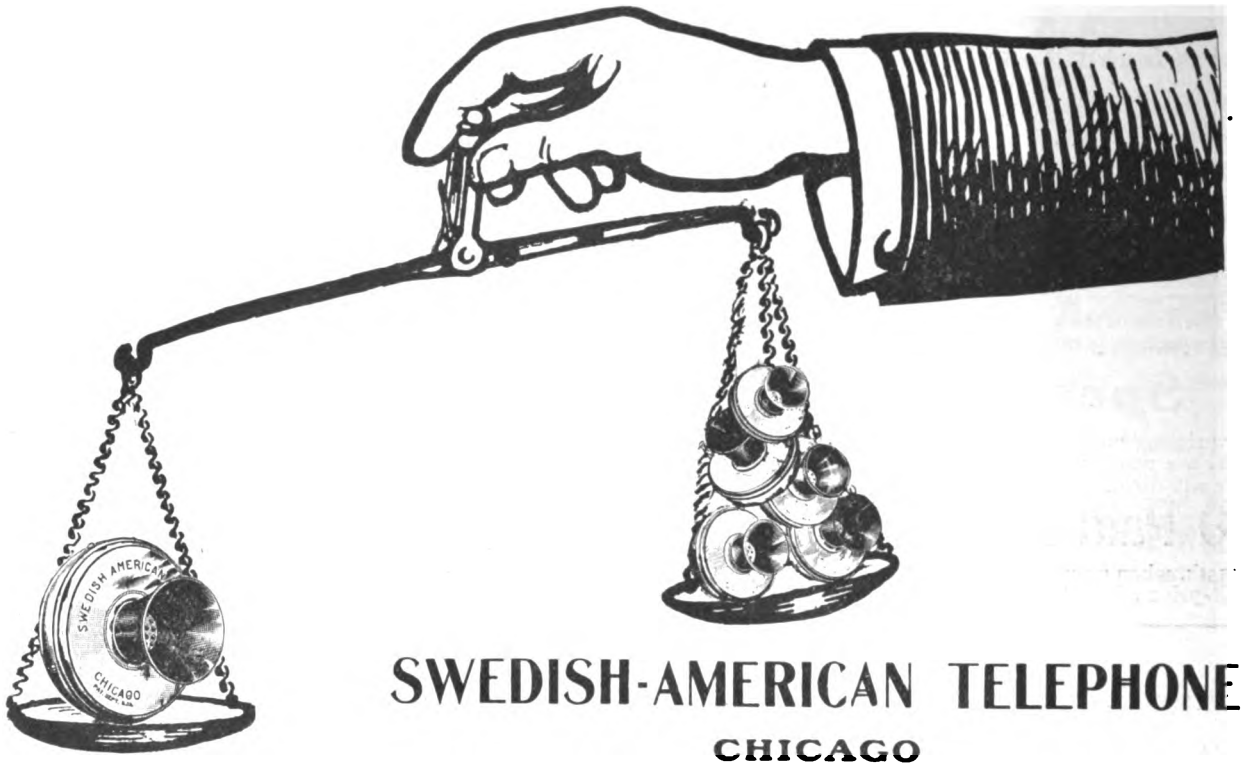

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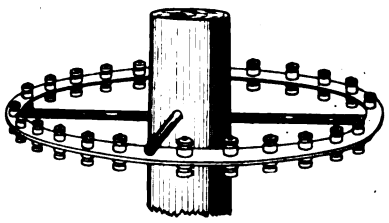

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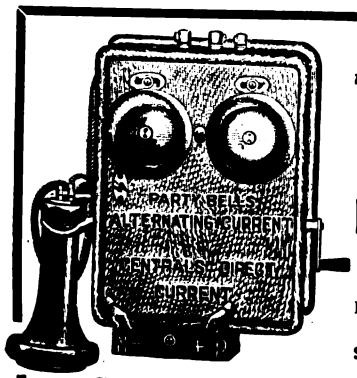

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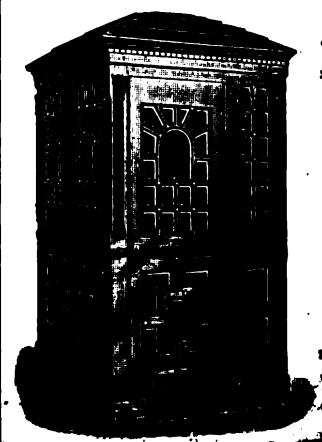

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VOLUME 10 SATURDAY, SEPTEMBER 3, 1904 NUMBER 10

THE LARGEST TELEPHONE INSTALLATION AFLOAT

By Edward A. Tyler.

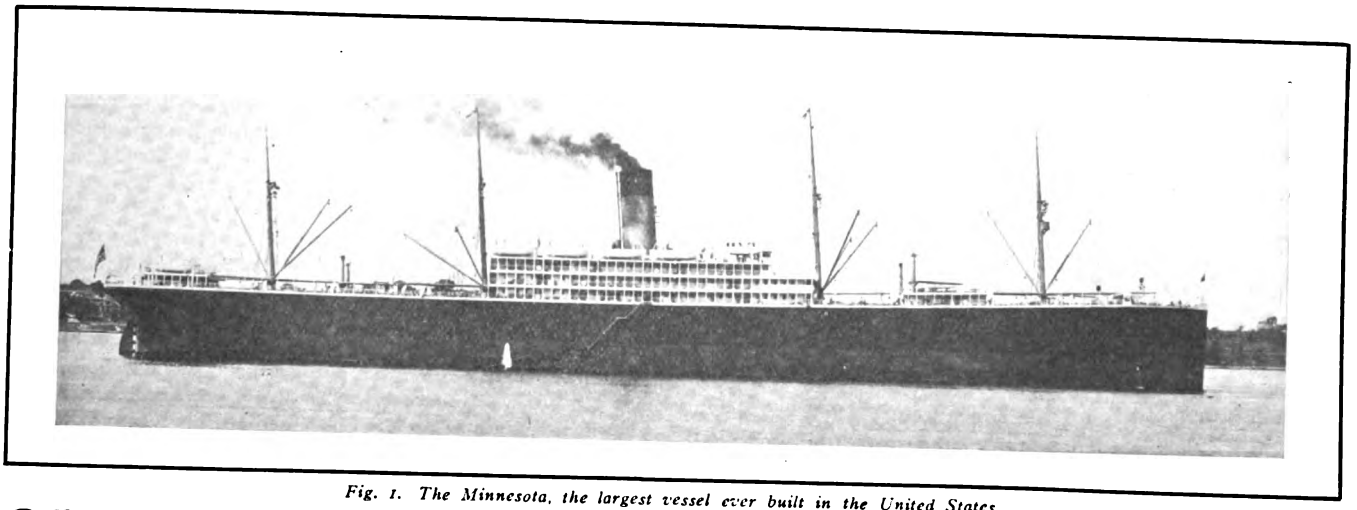

Fig. 1. The Minnesota, the largest vessel ever built in the United States.

On April 16, 1903, there was launched from the yards of the Eastern Shipbuilding Company, of New London, Conn., the largest mercantile ship ever built in this country and the second largest in the world, her only superior in size being the *Baltic*, of the White Star line. As the ship glided smoothly down the ways, Miss Clara Hill, daughter of Mr. Jas. J. Hill, christened her *Minnesota*. A view of the boat as she was leaving New London is shown in Fig. 1. This great vessel will ply between Seattle and Tacoma, on Puget Sound, and ports in China, Japan, and the Philippines. She is owned by the Great Northern Steamship Company.

Of special interest to telephone men is the fact that the largest telephone system ever placed on board a vessel is installed on this steamship. There are two distinct installations; one, the general, which is a regular exchange, the other an intercommunicating system, which connects with the executive offices of the ship. Both systems were furnished by the Electric Gas Lighting Co., of Boston. The exchange of the general system is placed in a separate room in the after part of the vessel and consists of an 150-line switchboard mounted in a light oak cabinet to match the general surroundings. Figs. 4 and 5 will give a good idea of the appearance of the switchboard and its interior mechanism. The system employed is central energy and is a combination annunciator, with telephone attachment. The signals are similar to the well-known annunciator targets and are mounted in six rows of 25 signals in each row behind a glass plate. Under each vertical row is placed a reset handle for restoring targets to their normal positions. Below are mounted the jacks associated with the lines, and under these are the supervisory signals of the cord circuits, of which there are 15. Each pair of cords has a listening key and also two push buttons for ringing in either direction. The signal bells of the telephones are of the vibrating type and are rung with direct current. An additional drop and jack is mounted upon the board, which can be connected by means of a flexible cord with the city system of any port at which the vessel may stop. For this a generator is provided for signalling. In this manner it will be possible for the captain of the vessel to communicate directly with the agents of the ship without leaving his cabin.

Fig. 2. Water-tight telephone for exposed positions.

Every stateroom on the vessel has a telephone, and it is possible for a passenger to lie in his berth and order his meals from the steward's department. A novel feature of this system is when

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more than two parties wish to talk together. A special connecting key is so arranged that two pairs of cords can be connected together so that four parties can hold a general conversation without interfering with any other connections that are made. There are two of these keys, one associated with the first two pair of cords, the other with the second two pair of cords.

Fig. 3. Marine Telephone on Forward Bridge.

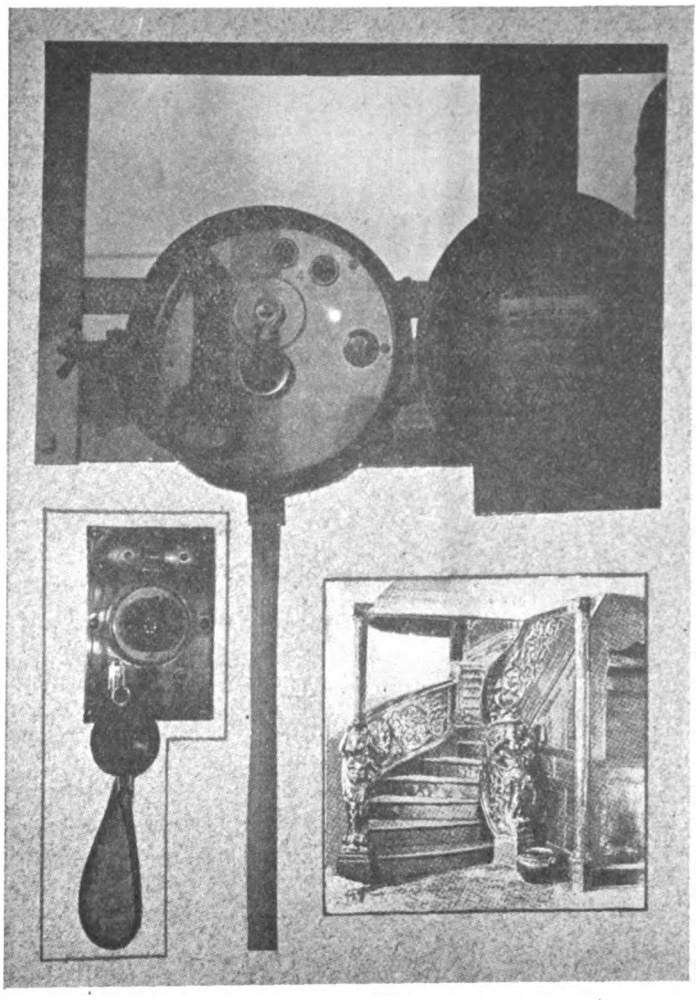

Fig. 4. General System Instrument. An Interior View of the Vessel.

The wiring of the system has been done upon a three-wire plan, that is, three wires run to each telephone. Of these, one is common, one a talking wire and one a signal wire. The operation is as follows: As soon as a call is received a plug is inserted in the jack of that line and if the supervisory signal lights up, it indicates the party wishes to talk. Otherwise the signal is received as a regular call for a steward. Should the party calling wish to talk with some one else, the connection is made in the usual manner.

Besides the instruments in the staterooms, telephones are installed in almost every part of the vessel, such as the captain's private stateroom, the ladies' drawing room, the smoking room, library, kitchen, pantry, steward's department, laundry, chief engineer's office, chief electrician's office, so that no matter what a passenger's wants may be, he can be connected with the department desired. The instruments are set flush with the walls and are finished in black. Watch-case receivers are used, and the transmitters are of the solid-back type. Fig. 4 will give a general idea of the appearance of the telephones.

The intercommunicating system is distinct from the general system and consists of eleven stations, as follows: The forward navigating bridge, main navigating bridge, after navigating bridge, port and starboard engine rooms, crow's nest, pilot house, chief engineer's office, chief electrician's room, central electric lighting station, and dynamo shelf. Of these, the first five are water-tight marine type instruments, similar to the one illustrated in Fig. 2. This construction is necessary on account of their exposed position to moisture and dampness. In Fig. 3 is shown the one situated on the forward navigating bridge, which connects with the main and after navigating bridges. Attention is called to the unique construction of the instrument. The exterior consists of a copper shell. On the inside is a ridge upon which a plate carrying the mechanism is fastened by means of screws. Between the plate and the ridge is placed a rubber gasket and, as a further precaution, the screws fastening the plate to the rubber are provided with rubber insulating bushings. The receiver cord is covered with a rubber tube and a rubber earpiece is provided for the receiver, this being necessary on account of the noise or the rushing sound of the wind when the vessel is traveling fast. Another unique feature is the hook-switch. The hook upon which the receiver hangs is a dummy support, the switch itself being shown to the right of the plate. It is operated by the cover, so that when the cover is closed the circuit of the telephone is open and when the cover is open, the telephone circuit is closed. An interesting feature is the fastening mechanism which holds the cover to the front of the box. The pitch of the thread of the thumbscrew and locking bolt is made quite coarse, so that it can be rapidly unfastened and thus save time in the case of an emergency. These instruments, as will be noted from their position, connect with the vital parts of the ship, and, in consequence, their operation must be as nearly perfect as possible. The position of the instrument in the crow's nest is worthy of passing note. The crow's nest is a sort of platform placed high up on the forward mast and is used as a lookout point for observation, being so far forward and so much higher than any other observation point that the lookout in the crow's nest can distinguish objects further off and much more quickly than can a lookout at any other point. Consequently, he is able to communicate with the officers in charge as soon as he notes anything out of the ordinary, and, having a telephone, can do so with much more certainty than would be the case were he to have to call out his observations, as is generally the case.

Fig. 5. General System Switchboard.

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A brief description of the *Minnesota* is herewith given that may prove of interest to some of our readers. The extreme length of the vessel is 630 feet and beam 73 feet 6 inches. The height, measured from the main navigating bridge to the keel, is in the neighborhood of 130 feet. As figures sometimes fail to convey the size of the object that is being described, we would suggest that our readers measure off similar distances to gain a better idea of this immense vessel.

The necessary driving power is furnished by 16 water-tube boilers which deliver steam at a pressure of 230 pounds to 2 sets of triple-expansion engines, which develop about 10,000 horse-power. These engines drive 2 screws at about 78 revolutions per minute, at which speed the vessel is traveling between 14 and 15 knots.

There are 8 decks, 5 in the hull proper and 3 in the superstructure. The dead weight cargo capacity is 30,000 tons. The anchor chains are said to be the heaviest ever forged, each link weighing 95 pounds. All the auxiliary apparatus, such as hoisting machinery and refrigerating plant, is electrical, this vessel having the largest generating plant ever installed on shipboard. Six 75-k.-w. generators furnish current at a potential of 125 volts. There are 720 motors, which range in size from one-eighth h.-p. to 100. The steering gear is operated by electric motors, as are all winches and other machines usually run by steam on board war ships. To look after this large amount of electrical machinery, there are six electricians, in charge of one chief electrician, Mr. Stilman H. Conner.

In closing, it may be interesting to note the application of electricity to the comfort of the passengers. The fans, which supply hot and cold air and also exhaust, are run by electric motors. In the kitchen, toasting, broiling and stewing are done by means of electric heaters. In the staterooms, electric curling-irons are provided for the comfort of the women passengers. In the laundry department, the irons are heated by electricity, and electric heaters are provided for every stateroom, three variations being possible — low, medium and full. Throughout the ship wherever electricity could be employed it has been used, it being the idea that more efficiency could be secured by its use than by any other means.

Fig. 6. Showing Wiring of Switchboard.

James J. Hill.

Besides being the largest vessel ever built in the States, the *Minnesota* will also possess the additional distinction of being the largest vessel that ever sailed upon the Pacific, far eclipsing any other boat upon this ocean.

After the vessel's speed trial she will load with 10,000 tons of coal at Newport News, Va., and will proceed by way of Cape Horn to San Francisco. On the way a stop will be made at Coronelle, in Chile, for coal, and the *Minnesota* will probably reach San Francisco in fifty days, and Seattle a week later. Although not subsidized by the United States Government, special provisions have been made for the carrying of between 1,400 and 1,500 troops, so that if at any time her services are needed, she will be immediately available as a troop ship. Besides this there are accommodations for a number of steerage passengers.

In conclusion, I wish to thank Mr. Sutherland, the traffic manager, and the officers of the ship for the courtesy extended in furnishing information.

A UNIQUE TELEPHONE PUBLICATION

OUR esteemed contemporary, *The Electrical Review*, of London, informs us of a novel undertaking that has just been initiated in Paris, for the education of telephonic subscribers. In a general way when anything goes wrong with telephone service, the subscriber blames the company, and never for a moment considers that at least a portion of the difficulty might be attributable to his own carelessness. In France, however, it appears that the subscribers have recognized that perhaps a campaign of conduction among themselves might be productive of good results. So the subscribers in Paris have combined in an association that proposes to publish a journal which shall be largely devoted to pointing out the various means, whereby the subscribers themselves can co-operate with the telephone company in an attempt to expedite the service and to improve its efficiency.

To begin with, the Association has started out with the idea of arranging parties of subscribers who, from time to time, shall visit the central office and inspect the way in which a telephone system is carried on. This is certainly a grand idea, for if subscribers in general had a notion of how a switchboard is operated and what the avocations are that the operator must perform in order to make a connection, a much greater tolerance would be exercised and each would be able to aid the operator to an enormous degree. The company impressed with the endeavor of the subscribers to co-operate, exhibit statistics showing that in many cases complaints of poor service arose from failure on the part of the subscribers to properly observe the correct routine to obtain a telephone connection.

It was shown that subscribers would hang up the receiver after having called the exchange, and thus lose the connection they desired; and in many cases disconnections arose from the fact that the subscribers replaced the receiver on the hook prior to the completion of the conversation, or in some other way, accidentally or otherwise, gave the disconnecting signal. Frequently wrong numbers were given or subscribers made errors in obtaining the proper number from the directory. In fact, from a statistical standpoint it was shown that something over 60% of alleged errors arose from the failure of the subscribers to properly observe telephonic methods. The monthly Journal, which is to be issued, is to be devoted largely to explaining and teaching subscribers the various methods whereby the service may be improved by their co-operation. Certainly this is a unique undertaking, and one that can be of inestimable service to telephony by cultivating a proper spirit among subscribers.

We therefore extend a cordial welcome to the enterprise and wish it unbounded success. We believe that if some similar plan were taken up in this country, the number of complaints of poor service would be decreased by a remarkable percentage, and trust that some one may be found having sufficient altruism to take the initiative in an educational campaign.

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MAINTENANCE

ARTICLE I.

By Arthur Benson.

THE term "maintenance," strictly speaking, means the keeping of a plant in proper working order. As applied to the telephone business, it embraces some branches of work that do not come under this definition. Also, it sometimes happens that certain classes of work, of a strictly maintenance nature, are not performed by the department whose especial duty it is to keep the plant in repair. In these articles, the various classes of work necessary to maintain the plant will first be considered, and the essential features of each studied. The most advantageous scheme of organization for the maintenance department will then be dealt with.

The work of maintaining the telephone plant is twofold: First, that of repairing damage comparatively slight in nature, which

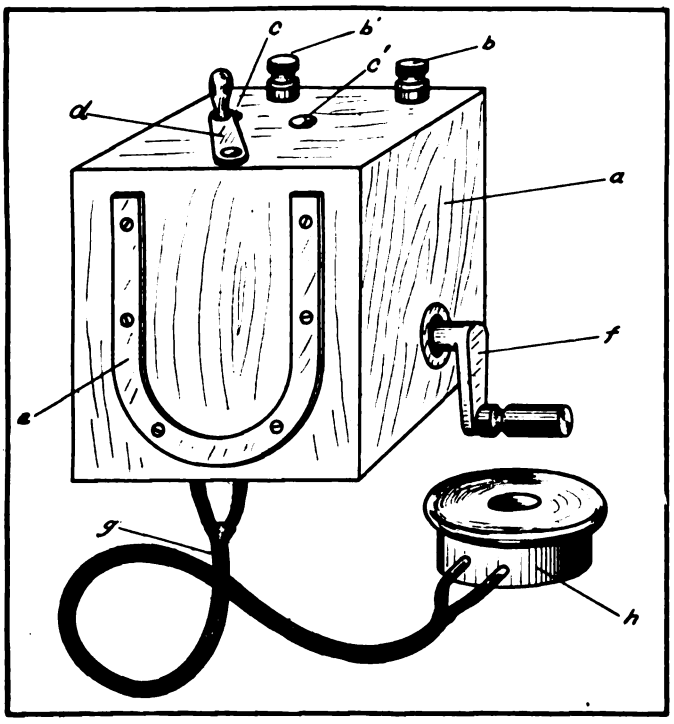

Fig. 1.

recurs continuously, and that of replacing the general wear and tear, which goes on gradually. This latter work is in the nature of rebuilding, and will therefore not be considered in this article.

The work of repairing the damage that occurs from day to day may be classed under four heads, according to the position of the plant affected. These headings are as follows: Maintenance of open wire lines; maintenance of subscriber stations; maintenance of cable lines, and maintenance of the central office apparatus. Under the first heading, the term "open wire lines" includes bridling cables and drop wires. Under the heading "subscriber station" is included the house wiring from the arrester to the telephone. As a general thing each one of these classes of work calls for the services of a man trained to its peculiarities. The maintenance of open wire lines, from its very nature, necessitates the services of a lineman. The maintenance of the subscriber station requires the employment of a man thoroughly familiar with the design and operation of the telephone, while men thoroughly familiar with the details of structure and operation of the central office apparatus are needed for its maintenance. In maintaining cable lines two classes of men are required: Those who locate the trouble and the men who clear it. The former class of work is performed by the galvanometer man; the latter, by the cable splicer.

The four subdivisions of the telephone plant, the open wire line, the subscriber station, the cable line and the central office apparatus, are subject to damage which is peculiar to each. And the troubles that occur have particular symptoms. For example, open wire lines are subject to damage by wind storms, lightning and mechanical injury generally. The apparatus at the subscriber station is apt to be broken by improper use, and it is possible to distinguish between a cross occurring on the line and at the subscriber station, or between a ground in the central office apparatus and one at the subscriber station.

No matter what the nature of the trouble may be, it can always be classed under one of the five following headings: "Open," "ground," "cross," "short circuit," miscellaneous."

Under the first heading are included all troubles which result from the continuity of the circuit being broken; under the second those troubles which result from an electrical connection with the earth. When two or more lines are thrown into electrical connection, they are said to be "crossed," while the term "short circuit" is used to denote the condition arising from both sides of a circuit forming mutual electrical contact. Under the head "miscellaneous" are included all other troubles.

In the following table will be found a list of troubles under their proper classification:

Swinging.	*Dead.*
Open.	
Cut-Out.	High Resistance.
	Heavy Line.
Ground.	
High Resistance.	High Resistance.
Noisy.	Noisy.
Solid.	Solid.
	Escape.
Cross.	
High Resistance.	High Resistance.
Solid.	Solid.
Short Circuit.	
High Resistance.	High Resistance.
Solid.	Solid.
Miscellaneous.	
Open.	
Cut-Out.	High Resistance.
	Heavy Line.
Ground.	
High Resistance.	High Resistance.
Noisy.	Noisy.
Solid.	Escape.
	Solid.
Cross.	
High Resistance.	High Resistance.
Solid.	Solid.
Short Circuit.	
High Resistance.	High Resistance.
Solid.	Solid.

A further classification of troubles can be made, with a view of denoting the portion of the plant affected. Thus, when located

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on the line, the term "line trouble" is used, or "station trouble," to signify that the subscriber station is the point effected. When the fault lies in the central station apparatus the term "exchange trouble" is made use of. The following table will illustrate this point:

Line trouble.	Cable.
	Open wire.
	Bridle cable. Bridle wire.
	Cable box.
	Drop wire.
Station trouble.	Arrester.
	House wire.
	Telephone.
Exchange trouble.	Main distributing rack.
	Intermediate distributing rack.
	Coil rack.
	Relay rack.
	Repeater table.
	Composite rack.
	Switchboard.
	Exchange wiring.
Power apparatus.	Power switchboard.
	Fuse panel.
	Dynamos.
	Motors.
	Batteries.

Some companies further classify troubles according to the particular piece of apparatus affected, and this practice is useful in keeping the records of the maintenance department.

The Trouble Man.—The man whose duty it is to locate and clear open-wire line troubles, must be essentially a line man. He is distinguished by the appellation of "trouble man." Since it is often necessary for him, in the performance of his duty, to put himself into communication with the central office at various points on the line where no telephone exists, he carries as his essential tool a portable telephone, called a test box. This instrument is wired, as shown in Fig. 2. At *a* and *a'*, two binding posts, to which the line to be connected is attached. The binding post *a* is permanently wired to the heel of a two-way switch, *b*. One of the contact buttons of this switch, *d*, is wired to a magneto telephone, *e*, which can be used as both receiver and transmitter. The other one, *d'*, is wired to a magneto generator, *m*, which is connected in series with an 80 ohm buzzer, *n*. The opposite terminals of the receiver and buzzer are wired to the opposite binding post, *a'*. With the switch, *b*, in the position shown, the receiver, *e*, is connected to the line, and *m* and *n* are cut out. On the other hand, when the switch is thrown over to the contact, *d'*, *m* and *n* are cut in on the line, and *e* is cut out. The first position is for talking, and the second for signalling. This

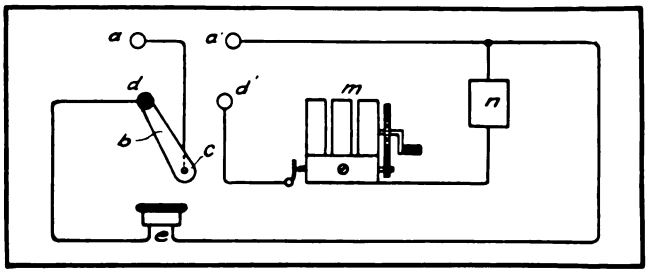


Fig. 2.

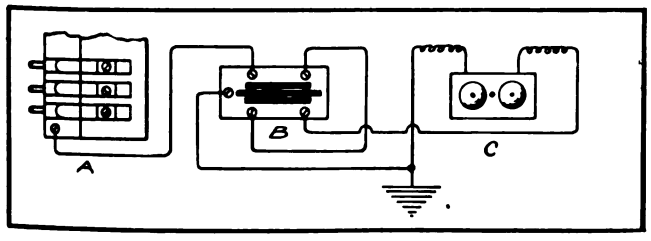
apparatus is mounted in a box, *a*, about 4 inches square, as shown in Fig. 1; the binding posts being shown at *b'*, *b*, the switch buttons at *c' c*, the switch lever at *d*, and the generator crank at *f*. At *e* is shown a U-shaped metallic clip fastened to the side of the box, for holding the receiver, *h*, when it is not in use. The box is usually equipped with a leather strap, not shown in the figure, which enables the "trouble man" to carry it over his shoulder. The receiver cord is shown at *g*. For convenience in climbing poles, the lineman should always be equipped with a pair of spurs. A pair of 6-inch and a pair of 9-inch pliers are all the additional tools that are required.

A CARBON GROUND DETECTOR

By R. H. Johnson.

A NUMBER of articles have appeared lately describing automatic fuse alarms for making known the presence of an open line fuse. A grounded carbon arrester will, on a grounded or common return system, render a line inoperative as effectually as an open fuse.

For a carbon ground alarm I have devised the arrangement shown in the accompanying diagram. *A* is the carbon arrester



ground strip. *B* is an arrester with a large carbon surface. *C* is an 80 ohm extension bell. The connections are clearly shown in the diagram. It will be noticed that the ground strip of the cable terminal is grounded only through the extension bell, while the arrester *B* has a narrow air gap, allowing lightning to jump across it directly to the ground without passing through the bell. The connections to *B* might be made in two or three different ways, but I believe the one shown in the diagram to be the best. This is also a good way of connecting this style of arrester to a grounded telephone, with the telephone in the place of the extension bell and the line in the place of the strip *A*. All connections should be made as direct as possible, with the exception of the wires to the bell *C*, which, if curled, will by virtue of the added self-induction, help to keep lightning out of the bell. As an additional precaution for the protection of the bell, a switch may be used to short circuit the bell during severe storms.

In case of a ground in any of the carbons the bell announces the presence of the ground, in a grounded or common return system, as soon as either the operator or subscriber attempts to ring on the line. On a metallic system ringing to ground, the bell would announce a carbon ground as soon as the operator attempted to ring on that side of the line. On a straight metallic ringing and talking line the alarm bell would not show up a carbon ground; indeed, it would not be as necessary that it should as in the other case, because a ground would not interfere with the signaling. When it is known that a line is grounded it may easily be found by connecting several cells of battery to the ground strip in series with a vibrating bell and running the remaining terminal over the conductors until the ringing of the bell shows up the grounded line. Time can be saved on this test by having more than one extension bell; say one for every 200 conductors.

In installing this device it is an additional advantage to have a switch to open the ground circuit between the ground strip and the bell while making tests for grounded carbons; otherwise a sufficient ground might be obtained through the 80 ohm bell to throw the drops if more than two cells are used in testing. On a common battery system the switch would be almost a necessity.

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GRAPHIC RIGHT OF WAY RECORDS

By Harold A. McMann.

THE heterogeneous collection of records one sometimes sees in the offices of a telephone company are often plainly inefficient; the possibility of simplifying matters to a minimum never seems to enter into the heads of the officials in charge. Right of way records—that is, records showing the right of way previous to a pole line being built—prove to be no exception to the above state of affairs, and could be simplified so that the approbation of those using the system would be given unquestionably. The prevailing method of keeping the above record appears to be by either a book or card system, which does not, in the opinion of the writer, possess the merits of a graphic system, two examples of which are herein described.

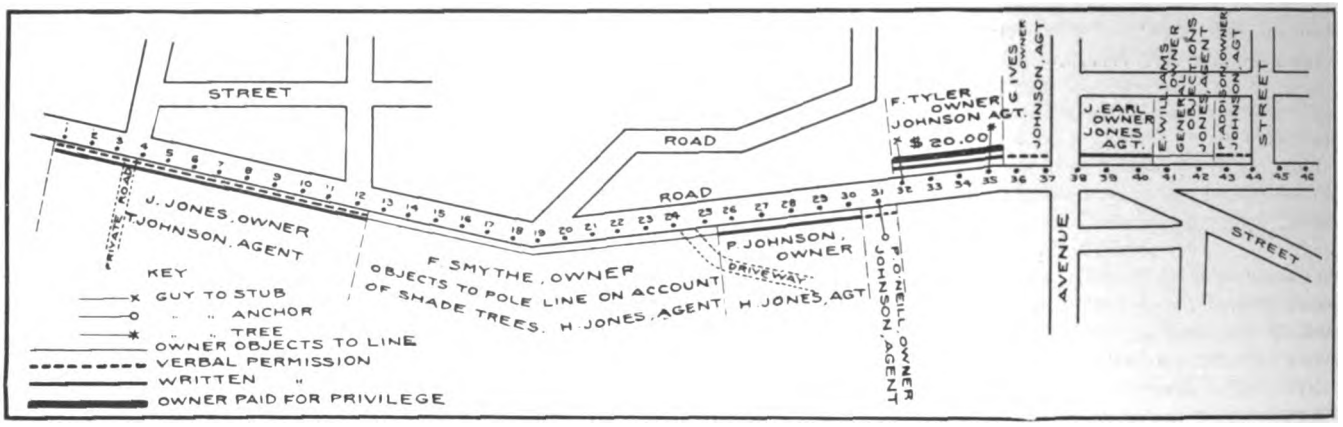

Fig. 1.

Previous to a pole line being built it is customary to make what is generally known as a "route map"; this embodies all the points of vantage and disadvantage along the proposed right of way that is to be secured. A typical map of this description is shown in Fig. 1.

The number and approximate location of the proposed poles should be marked on the map by a small dot; these, of course, should be consecutively numbered to avoid confusion and errors in the record.

We will now suppose that the right of way agent has secured, say, a verbal permit for poles 1 to 12; this is recorded on the map by a heavy dotted line, a thin dotted line being drawn down from the inclusive poles. If, later on, he secures a written permit for the same right of way a heavy line may be drawn under the heavy dotted line. Now suppose that from poles 13 to 25 he is unable to secure permits of any description; this condition is indicated by a thin line, and the approximate reasons for his being unable to secure it being written below. From poles 26 to 30 a written permit has been secured, the fact of which is shown by a heavy line together with the owner's name and the amount granted to him for the privilege.

Privileges for placing guys, stubs and anchors may be recorded by indicating a guy by a short line radiating from the pole; a stub by a small cross, and an anchor by a circle.

A guy to a tree is shown in a similar manner, with the exception of a small star being marked for the tree. The privilges are of course generally included in the ordinary right of way permit, and should not be shown until secured.

Payments as they are made for the privileges granted by the property owners are indicated by a very heavy line drawn under the others; this shows at a glance that that section of the line is O. K. It is a good plan when several agents are working on the line to put their names down adjacent to the respective rights of way secured by them. Lines of different colors may be substituted for the black lines mentioned above and would no doubt make the record easier to consult.

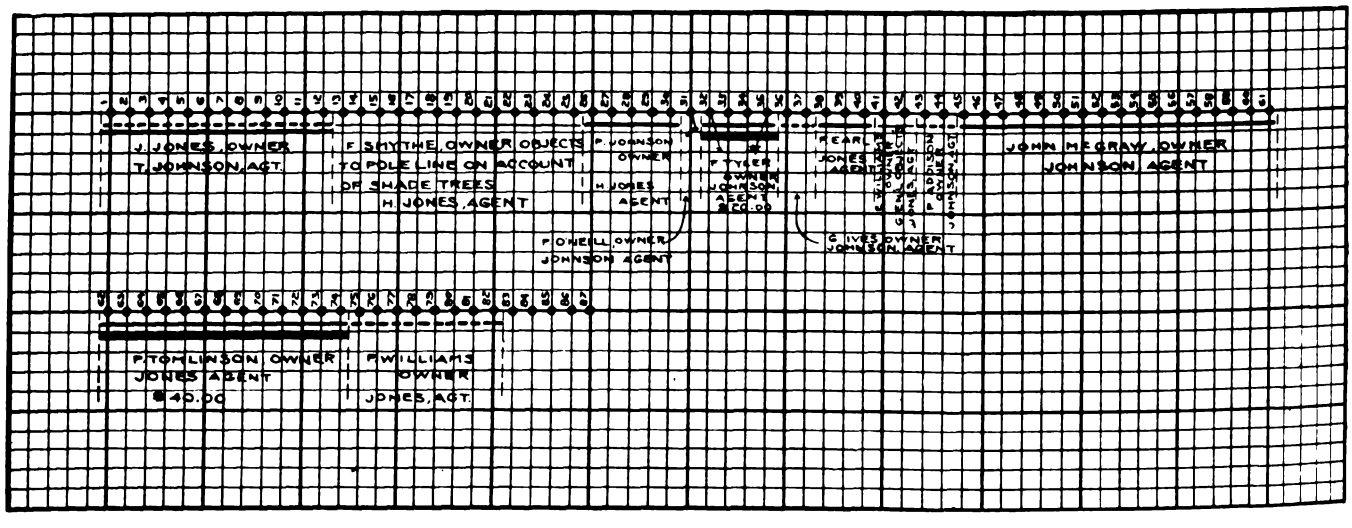

Fig. 2.

Variations are shown on the accompanying map which meet all probable conditions and show at a glance the state of affairs along the line at any point.

The second method of keeping a record similar to the above is shown in Fig. 2, which represents a sheet of ordinary section paper, each vertical line being allotted to a pole.

The numbers are run along to the end of the sheet, then continued below at a distance determined by the space required for owners' names, amounts paid and various other items that may be necessary. This scheme is simpler than the first, in the fact that no attempt is made to show the physical conditions of the line or country, and is easier to consult owing to the above named

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eliminations. It is not unusual, however, in meeting special requirements to combine the two systems, thus forming an admirable combination. The advantages of these records are manifest. A set of maps or charts are far less likely to be mislaid or to have errors recorded upon them, as are cards or books; besides the system is very flexible, special conditions bringing forth ideas to the users that lend themselves to all possible contingencies in securing rights of way.

MR. CLAUSEN ON EXCHANGE ARRANGEMENT

THE writer notes, in your August 6th edition of THE AMERICAN TELEPHONE JOURNAL, page 86, an opinion on an exchange arrangement suggested by the writer in an article on pages 373-374 of the December 5, 1903, edition of THE AMERICAN TELEPHONE JOURNAL. Mr. B. C. Wilhelm takes exception to the writer's proposed exchange arrangement, suggesting that the arrangement is not in accordance with the most advanced practice.

When the writer prepared the article referred to, he endeavored to cover the subject in as brief a manner as possible, and allowed the two floor plan drawings to take up the major portion of the article; this for the purpose of permitting those not familiar with the designing of floor plans for telephone exchanges to obtain some idea as to the general requirements which it is necessary to meet. It now appears, however, as though the writer might have gone a little bit more into details.

Mr. Wilhelm states that the floor plan, as designed, is not in accordance with the most advanced practice, and qualifies this statement by saying that "one of the most potent factors in determining the nature of the floor plan is the probable growth." This objection should be effectually nullified when we read the last portion of the writer's article, from which the following is quoted: "The drawing is to scale, so that it will permit anyone to determine actual dimensions required for any portion of an exchange equipment having an immediate capacity of 2,400 lines, 120 lines per operator's position, and provisions for permitting an ultimate 100 per cent increase."

From the foregoing it will be observed that "*the most potent factor*" has been taken care of by assuming a 100 per cent. increase, and *no more*.

Mr. Wilhelm continues, and suggests that the toll board should should not lie at right angles to the main switchboard and that it should rather be placed on the position which the writer has assigned to the last two sections of the main switchboard. In other words, an increase in the toll board and an increase in the main exchange shall serve to decrease the permissible ultimate capacatiy of each of these two switchboards. And, as if on afterthought, Mr. Wilhelm discovers this fact, he states that when the main exchange reaches the point where the increase sections crowd the toll board, the toll board may be removed to another building. Aside from the bad arrangement resulting through placing the toll board in a portion of the exchange where the local exchange switchboards are required to be placed upon making future increases, we have also the undesirable arrangement introduced through not providing any means for permitting the switchboard men to easily reach the toll board from the first-floor terminal room—both objections being quite apparent to anyone familiar with exchange operation.

Quoting further from the writer's 1903 article, we have the following: "The toll switchboard has an immediate capacity of two sections, with allowance for an extension to an ultimate of four sections, or eight positions. . . . The arrangement of this toll board may be modified, and the number of sections installed may be increased by a slight rearrangement. The main object in view is to provide a room large enough for any probable extension in an exchange layout having an ultimate of 4,800 lines."

From the above, and by an examination of the floor plan, it will be observed that an increase in the number of toll sections is possible, but not considered a probable necessity. Mr. Wilhelm suggests that no *B* boards are shown, but that they are probably present in the main switchboard. This is not understood. Surely no B boards from branch exchanges are necessary when there are no branch exchanges.

However, in order to be a little more explicit as to the first section on the main switchboard being provided with two positions marked "Toll," it might be mentioned that one of these positions is ordinarly used only for trunking service from the toll board to the main switchboard. The remaining position, however, is provided for possible overflow in the trunking circuits, and also to meet a requirement often called for in the design of the medium size exchanges in which for night service the toll line terminals appear on the toll board, and operated from that point during the day, are transferred to the first position in the main switchboard for operation during the night.

Now, as respects the suggestion that the main switchboard should have commenced to read from a point near the first position of the toll board, it need only be necessary to draw Mr. Wilhelm's attention to the fact that in order to do this and not rearrange the first floor, would ultimately represent a cost for cable and labor of about $1,800. This to be added to the cost of the main exchange installation, which is quite an item, and one that Mr. Wilhelm evidently overlooked.

There is one other point which was overlooked in the criticism, and that is, supposing the main exchange is extended to the ultimate capacity assigned for it: We should have to figure on providing accommodation for about forty-five, if not fifty, operators. The locker room and operators' retiring room, it will be observed, is arranged only for a little over one-half of this number, and the writer might have added the suggestion to his 1903 article that when the main exchange reaches an ultimate of 4,800 lines, the toll room would have to be abandoned and located in another building, or on another floor of the same building, the locker room extended into the present operators' retiring room. This was the ultimate objective arrangement of the operating floor, though the writer originally did not deem it necessary to refer to this obvious possible change in the arrangement.

GAMBLING BY INJUNCTION.

IS "gambling by injunction" possible in Chicago? Mont Tennes, handbook "king," thought so when he obtained a temporary injunction from Judge Brentano restraining the Chicago Telephone Company from disconnecting the telephone switchboard in his poolroom at 823 Larrabee street, Chicago. The Schuettler gambling detail thought differently recently when it raided the place and bore the switchboard away in a patrol wagon.

"Stop," said Tony Francis, manager of the poolroom, when the riders broke down the door and wrenched the switchboard from its fastenings. "Better read that paper on the door before you go any further." The detectives ceased their attack on the switchboard and read the paper. It served notice that the telephone company was enjoined from removing telephone fixtures.

"Back to the switchboard," said Breternitz, leader of the raiders, when the party had finished their reading. Thereupon the board was carried down three flights of stairs and into the patrol wagon. Francis, the manager, was arrested on a charge of disorderly conduct. "Our position is that only the telephone company was prohibited from removing the switchboard," said Schuettler.

The injunction was granted by Judge Brentano on representations made by "Ed" Morris, attorney for the poolroom gamblers, that the building in Larrabee street was used by "James Harding" for "conducting a legitimate cigar business."

Evidence that the board was being used for gambling purposes was obtained by Schuettler several weeks ago, when three members of the gambling detail, attired as telephone repair men, visited the place and confiscated a package of betting sheets. The telephone company will use this evidence in an attempt to have the injunction dissolved.

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TELEPHONE TAXATION IN ILLINOIS.

MUNICIPAL corporations all through the Middle West are watching with interest the outcome of a law suit which is to determine whether the city of Elgin, Illinois, has the right to tax the Chicago Telephone Company one dollar per annum for each telephone in use in the city. Independent telephone companies will be especially interested in this suit.

The Chicago Telephone Company is a Bell concern having its headquarters in Chicago and operating in some thirteen counties. The company holds its grant in Elgin by virtue of an ordinance similar to that in effect in nearly every city where the company does business, and probably similar in substance to many franchises under which Independent telephone companies are operating. The litigation is therefore very important to corporations generally. Whatever the result the case will probably be carried to the supreme court for final decision.

An idea of the magnitude of this suit to this one corporation may be gained when it is known that the concern now has in operation about 125,000 telephones in Illinois. If Elgin succeeds in imposing an annual tax of one dollar a telephone the other municipalities in which the company operates will follow suit in all probability, and a considerable decrease in the company's earning power may be expected.

The thousand dollars or more which would have to be paid into the treasury of Elgin each year is a comparatively small matter. The real question at issue is the power of a municipality to tax a telephone company in this manner.

The attorney who has had direct charge of drawing the papers in the case believes that the fight will be upon the grounds that the council attempted class legislation in trying to tax the company. He expects that the case will be carried to the supreme court on legal questions.

The company's franchise in Elgin was passed in 1881. The wording, in so far as it relates to this case, may be of interest to readers of the AMERICA TELEPHONE JOURNAL everywhere:

. . . "The Chicago Telephone Company is hereby authorized to erect telephone poles in the streets of the city of Elgin and maintain a line or lines of telephone in connection with the same.

"All procedings of said telephone company and of the privileges acquired under this ordinance shall be subject to any ordinance relating to the same which may hereafter be passed by the city council of the city of Elgin."

This ordinance was accepted by the telephone company in a letter written to the city officials. Last spring the council, acting under the last paragraph in the ordinance quoted, passed a further ordinance wherein the company was taxed one dollar per instrument then in use in the city.

This Bell concern has a powerful rival in Kane, Will and some of the other Illinois counties which the Bell has always considered as its exclusive territory. This rival is the Interstate Telephone and Telegraph Company, which already has a long-distance line across the State in several directions. This Independent company in order to secure an otherwise favorable franchise in the thriving cities of Aurora, Elgin and Joliet, Illinois, agreed to pay into the respective city treasuries the sum of one dollar a year for each telephone in use during a limited number of years. This has not been a great hardship for the Interstate company, and it has kept the city councils in great humor because of the revenue derived from the concessions. These Independent franchises undoubtedly gave the Elgin people the idea of charging the Bell concern a similar sum of $1 a year per telephone. The Aurora Council tried the same thing in a different way two years ago. There the Chicago Telephone Company was being distanced by its young and vigorous Independent rival, partly because of the fact that the latter's wires in the business district were all under ground, while the Bell wires were on poles. The Bell people finally asked permission to lay an underground conduit and, while this was a consummation devoutly wished by all, the council tried to use the concession as a club with which to secure $1 a year per telephone. The attempt failed.

AN IMPORTANT QUESTION.

Independents have no love for Bell companies anywhere, but because of the principle involved will hope that the company may win this suit and settle the question for all time, as the fact that a city cannot exact rental for a legitimate use of its streets was settled. Unless the Elgin franchise has expired entirely and the company has absolutely no rights under it, it is difficult to see how the council can impose further burdens at this stage of operations.

There seems to be a growing disposition among cities to exact some compensation for the use of their streets by quasi-public corporations. Sometimes this takes the form of free telephones in the various city offices; sometimes of a specified annual sum per telephone, as in the cases cited. Peoria, Illinois, has granted an Independent company a franchise which requires the payment of a lump sum of $1,000 a year. Springfield, the Illinois State capital, imposed no burden upon the Independent company, except free telephones, in a franchise granted one year ago; but now is seeking to collect a pole tax of $1 a pole annually. Naturally the company is resisting this, as the aggregate tax would amount to several thousand dollars a year. This case, too, is liable to go to the Supreme Court for settlement.

This is a question which must be faced by telephone companies seeking franchises. More and more is the telephone franchise becoming purely a business proposition and, wherever Independent telephony has obtained foothold, in opposition to Bell monopoly, telephone operation has become entirely a business proposition. There are still virgin fields in this great country where the hand of the telephone man "never set foot," but these are rapidly disappearing before the onward march of progress. If a telephone company wishes to continue in popular favor, without which there can be no permanent success, it must deserve that favor; it must deliver "the goods."

Herein lies the secret of the success of Independent telephony. Independent companies are managed by local people who understand local conditions, are identified with the locality and know the people and their needs better than anyone else possibly can know them. They are free to buy their equipment in whatever market they can get the most for their money, and, profiting by the experience and shortcomings of their Bell rivals, they seem to have started in with the determination of succeeding by deserving to succeed.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

TRIMMING TREES IN KANSAS.

Two years ago we built a telephone line on one of the streets in the city of Marysville, Kansas. The trees have now grown up into the wires; we want to string two more wires on this line, and cannot do so without climbing some of the trees. The property owner has forbidden us climbing the trees or trimming them. The trees stand just on the outside of the sidewalk. Kindly advise us in regard to this, and oblige.

M. T. C.

IN answering your question we will assume that you have received proper legislative and municipal authority to construct your lines in the streets. You thereby acquired power to do and perform all acts which are necessary to effect the purposes intended. The rule is that where it is necessary, in the construction or maintenance of a telephone company's lines, to cut or trim trees planted in or by the sidewalk, the company may, in the absence of a statutory provision prohibiting such act, cut or trim such trees so far as is reasonably necessary, but will be liable to an abutting owner in damages for any unreasonable and unnnecessary cutting. Joyce on Electric Law, Sect. 395.

TAXATION OF TELEPHONE POLES

Please send or publish in next issue the law upon the taxation of tele phone poles running through small tawns and villages, and oblige.

Dr. R. B., Sandy Spring, Md.

THE taxation of telephone poles must be considered, first, as connected with the question of interstate commerce, and, secondly, irrespective of such question.

Where the power to regulate the use of streets is granted to a village by legislative enactment, long-continued usage and constant adjudications of the courts, such municipal corporation may impose a reasonable license fee for the privilege of erecting telephone poles in its streets, lanes, and alleys; but, municipal legislation should not impose such unjust and unreasonable conditions as would evidence a purpose to harass, impede, or prevent interstate commerce. Certain ordinances of the city of Philadelphia provide that no telegraph pole should be erected in the city, except upon a payment of a license fee of $5 per pole, that there should also be paid a yearly charge of $1 per pole.

It was urged against the collection of said fees that the charge could not be maintained as a tax, because it was not within the power of taxation delegated to the city; that the charges were unreasonable as license fees and operated in substance as a tax, and that the ordinances were therefore void. The court held the fee reasonable and collectible as a police regulation, and that the charge was not a tax on business or on property, nor an interference with interstate commerce, and that the fee could be imposed. But such ordinances, imposing a yearly charge excessive to at least one-fourth the amount, and a total charge exceeding the cost of maintenance were subsequently held unreasonable and invalid. Much depends upon the nature and character of the business licensed, the extent of the privileges enjoyed and burdens borne, and of the expense, necessities, and indebtedness of the local government imposing the tax.

The use of the streets of a populous city would justify in a greater degree the exercise of the police power in this respect than would the use of streets in small towns where every conceivable use to which the public streets may be put is not exacted, but the demands of commerce and traffic are few. Fifty cents an electric light pole was held an unreasonable license fee where the cost of inspection was but 5 cents a pole; but for the city of Baltimore $2 per year per pole was held not an unreasonable license fee. It was held in Pennsylvania that a fee of $1 per wooden pole was not unreasonable. Joyce on Elec. Law, Sec. 99-100 and cases.

In two recent cases the Supreme Court of the United States held a license fee of $1 per pole to be unreasonable where the taxes were imposed by boroughs in which the company had no office and transacted no business, the boroughs being sparsely populated coal-mining communities, the buildings consisting chiefly of miners' cabins, and the poles located on the side of a highway which was little traveled. Postal Telegraph Cable Co. vs. Borough of New Hope, Adv. Op. (L. Ed.) No. 5, pg. 205. Ditto vs. Borough of Taylor, Id., pg. 208.

Irrespective of the question of interstate commerce, the question of how the poles of telephone companies are taxable depends entirely upon State statutes, their construction, and the enumeration therein of classes of property to be taxed. As a general rule the poles of telephone companies are held to be real estate and assessed as such. This is the rule in Tennessee and New York as well as in England. Western Union Telegraph Co. vs. State, 9 Baxt. (Tenn.), 509., 40 Amer. Rep., 99; 1 Amer. Elec. Cases, 326; People vs. Tierney, 126 N. Y., 166; 27 N. E., 269; 3 Amer. Elec. Cases, 40.

DISTRIBUTING BUREAU WINS.

JUSTICE WHITE, in the Supreme Court, in Brooklyn, N. Y., has granted a peremptory writ of mandamus directing the New York Telephone Company to restore its service to the New York and New Jersey Distributing and Circulating Company. This is the news distributing bureau which was raided as a poolroom exchange by the police last May, under instructions from Police Commissioner McAdoo.

After the writ of mandamus had been granted, an order was entered by Justice White directing the New York Telephone Company forthwith to "render telephone service to the applicant under all existing contracts between the telephone company and the applicant and to and from each of its telephones, with all public and private telephones, telephone stations, and subscribers upon the lines of the telephone or any of its allied or connecting lines."

In presenting the motion for the issuance of a writ of mandamus, counsel for the Distributing Company said that the company's business was "furnishing, distributing, and circulating, by telephone, news and information consisting of stock quotations, the result of baseball games, horse races, athletic contests, and sporting matters generally." During the last four years, he said that the concern had paid to the telephone company the sum of $48,000. As the telephone company was a common carrier, he argued that it must furnish service to anyone willing to pay for it.

Counsel for the telephone company, appeared to reply with a bundle of affidavits and police reports more than twelve inches thick, and Justice White asked him: "Do you expect to read all those to me this morning?" It was explained that most of the reports and affidavits were alike, and that it would be only necessary to read one. The affidavits consisted of one from the first vice-president of the telephone company, and three by police captains. These affidavits declared "on information and belief" that poolrooms within the precincts commanded by these captains were supplied with information by the Distributing Company.

"Let me see," interjected Justice White, "am I to refuse to grant this mandamus on the information and belief of a police captain? I think I have heard enough of this to have my mind made up; take your mandamus."

The Distributing Company's road to victory was not an easy one. On July 25th an application for a mandamus directing the telephone company to restore the service to the New York & New Jersey Company was made before Justice Scott, sitting in the Supreme Court. Justice Scott reserved his decision, but expressed the opinion very strongly at the time that no mandamus should issue, as the plaintiff company, known about town as the "Racing Syndicate," had a damage suit pending against the telephone company for breach of contract.

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IN THE OPERATING FIELD.

INTERSTATE CONVENTION TO BE HELD AT CHICAGO.

AT a meeting of the executive committee of the Interstate Independent Telephone Association of the United States, held on Monday, August 29, it was decided to hold the annual convention at Chicago on December 13, 14, 15.

OUTING OF CENTURY EMPLOYEES.

THE employees of the factory department of the Century Telephone Construction Company recently held their annual outing, going by tally-ho to Gardinville Park, N. Y., at which place they spent an enjoyable day. During the morning a baseball game was played between the machinists and assemblers, which, after fifteen spirited innings, was decided in favor of the machinists. The afternoon was pleasantly spent with athletic contests and races which greatly added to the general amusement of all present.

Mr. B. L. Moore, manager of the company, and Mr. W. W. Kidney, chief engineer and superintendent, officiated. The outing was much appreciated by the employees, especially as it was given during the height of the company's busiest season.

C. J. FIELD'S BID NOT ACCEPTED BY BALTIMORE.

C. J. FIELD, of New York, one of the bidders on the contract to supply the city with conduit material, was recently adjudged by the Municipal Electoral Commission an irresponsible bidder, and his bids, made through a local firm, were thrown out. An allegation by inference was made that Mr. Field submitted a sample of nine-duct terra cotta pipe, manufactured by a firm with which he had no connection, and then hid it. He was the lowest bidder on that particular kind of material, but when the alleged trick was exposed by Mr. Charles E. Phelps, Jr., Chief engineer of the Subway Department, the commission voted unanimously to throw out all his bids.

The conduit specifications called for samples to be delivered to Engineer Phelps for testing not later than five days before the date set for opening the bids. Mr. Field's nine-duct sample did not arrive until after the bids were opened. This brought a protest from the Standard Underground Conduit Company of New Jersey, through Mr. Thomas Ireland Elliott, who charged that the bidder was irregular and irresponsible. The commission sat yesterday to hear the protest, the hearing of which ended very abruptly after Mr. Phelps' expose.

The subway engineer said that when the sample in question reached his office he noticed its close resemblance to another sample made elsewhere. He placed Mr. Field's sample on top of the other, and arranged to have a representative of the firm which sent the first sample come and see if he could pick his out.

Mr. Phelps then went to lunch, leaving Mr. Field in his outer office. When he returned the latter's sample was nowhere to be seen. An investigation led to its being found at the bottom of a pile of old samples in a corner of the room. Mr. Phelps concluded his statement by saying that he would charge no one in particular with having concealed Mr. Field's sample, but left it to the judgment of the commission.

"That is enough for me," said Mayor Timanus. "There has been some irregularity. Mr. Elliott, you will not have to protest. The bids you object to will be thrown out. The bidder is not one for this city to deal with."

The other members of the commission—City Register Hooper and President Gail of the Fire Board—agreed with the Mayor, and Mr. Field's bids were rejected. The protest of the Standard Underground Conduit Company was in effect that Mr. Field, in submitting his samples, named nine factories at which they were manufactured. Two or three of these factories, it was alleged, do not make conduit material, others are not now in operation, one is for sale, and another is owned by one of the competitive bidders. The company added that Mr. Field could not supply certain varieties of the material if he were given the contracts.—*Baltimore Herald.*

STARK COUNTY TELEPHONE EXCHANGE DAMAGED BY FIRE.

THE exchange of the Stark County Telephone Company, at Alliance, O., was recently damaged by fire for the second time within two weeks. A cross between a cable line and a trolley wire of the Street Railway Company was the cause of a large part of the switchboard and drops being burned out.

At the time of the accident some linemen were at work on the poles to which the cable was fastened, but fortunately did not have hold of it in such a manner as to cause them any injury. The fire department was summoned, but before they reached the exchange the fire had been put out. It is estimated that the loss sustained will be nearly as great as the previous one, which caused about $2,000 worth of damage.

BRANCH EXCHANGES OF HOME COMPANY OF KANSAS CITY.

THE Kansas City, Mo., *Journal* has closed a contract with the Home Telephone Company to install one of its private branch exchanges. This step was only undertaken after a thorough consideration of the merits of the Bell and Independent companies' systems. One of the most important points in favor of the Independent system is that there are no party lines; another is the up-to-date character of the branch exchanges, which have all the latest improvements to facilitate speed and accuracy in operation. The Home Company has about thirty-five other private branch exchanges in operation at the present time and contracts for several more to be installed as soon as they can be secured.

THE LIMA TELEPHONE AND TELEGRAPH CO.

THE exchange of the Lima Telephone and Telegraph Company was opened for business in August, 1895, with 275 telephones connected, this being more telephones than there were in Lima before the advent of the home company. The reasonable prices and high quality of service rendered have served to increase the list of subscribers to 2,000. The company has, in the meantime, installed the first and only underground system of wires in the city, and has also installed the latest type of lamp signal, multiple switchboard. The line plant is of the highest grade copper metallic construction.

The policy of the company has been to provide the city with the best to be had in the art of telephones, and that its efforts have been appreciated is certainly shown by the magnificent growth of business.

The company occupies the entire third floor of the Harper Block and in connection with the United States Long-Distance Telephone Company, affords its patrons a very superior long-distance service. This being especially true in regard to service to a large number of cities, towns and villages in this part of the State having Independent exchanges only.

It is now furnishing service to about 200 rural subscribers in

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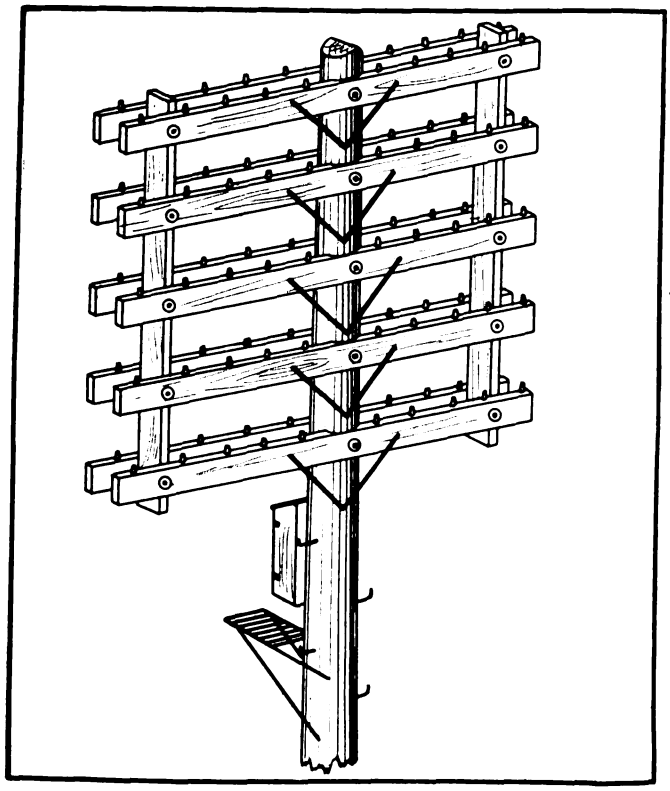
the vicinity of Lima, thus affording communication between the country and city subscribers without charge other than the regular rental.

The officers of the company are D. J. Cable, president; W. H. Duffield, treasurer; C. H. Cory, C. F. Stolzenbach, J. R. Sinclair, George W. Beers, J. B. and A. W. Hoge and Gustave Hirsch, directors, and George H. Metheany, secretary and general manager.

HINTS FOR CARE OF CABLE POLES.

By C. E. Nicholas.

CABLE poles require and should have as much attention as the central office equipment. All linemen should be instructed to use the greatest care while working on them and never to use spurs unless pole steps are not provided. These steps will more than pay for themselves in the prolonged life of the pole. All cable poles should be double cross-armed to increase their strength, but even this does not prevent the arm becoming loose



and twisting about by the linemen climbing on them. In order to overcome this difficulty a good idea is to omit the spreader bolts and wood blocks between the ends of the arms and to place instead a piece of 2-inch plank, as shown in the illustration, cut to fit from above the top arm to a little below the bottom one. Then bolt the arms together through the strips. This will add to the strength as the strain on any arm will be distributed to all the others, and a man standing on any arm will not get it out of position.

INDEPENDENT COMPANY FOR SAN DIEGO, CAL.

THE Home Telephone & Telegraph Company, of San Diego, Cal., is placing on sale $100,000 of its first mortgage 5 per cent. thirty-six year gold bonds, on basis of $1,000 bonds and $1,000 stock for $925, of which 25 per cent. is to be paid down and the balance not exceeding 15 per cent. monthly with accrued interest. The bonds are dated July 15, 1904, and are due thirty years hence, subject to call after 1914 at 105 and interest. A sinking fund is to be established after 1909, consisting of 10 per cent. of the net earnings. The officers of the company are: President, Charles E. Sumner; secretary and treasurer, William Godfrey. A prospectus issued regarding the prospects of the company is in part as follows:

The plant under consideration will be one of the best systems installed in this country, with conduit lines and switchboard capacity of 5,000 (metallic circuit) telephones and equipped with the new automatic switchboard and telephone system. The company was incorporated in California with $500,000 capital stock, and will commence operations with some 1,500 telephones installed. It is now erecting a three-story building for its own use in the midst of and close to the leading hotels, banks and business houses in San Diego, has laid its underground conduits, and is now setting poles as part of its work of installation. The entire telephone plant and exchange, it is agreed by contract with the Empire Electric Company of Toledo, Ohio, shall be completed and delivered on or before January 1, 1905, but it is expected will be in operation before that time.

The bonds and stock are to be issued from time to time as construction progresses, to the extent of $350,000 each of bonds and stock on the plant and installation of 1,500 telephones, the balance to be only for extension and enlargement as required. "It is expected that the number of installations will exceed 2,000, on which basis the net profits of the system will be capable of producing a 4 per cent. dividend on the capital stock and interest on the bonds, leaving a surplus in addition sufficient to provide a sinking fund to cancel the bonded indebtedness when due." The following estimate is furnished: 800 business telephones at $48 per annum, $38,400; 1,200 residence telephones at $24 per annum.

THE STANDARD VITRIFIED CONDUIT TO GO OUT OF THE RECEIVER'S HANDS.

THE numerous friends of the Standard Vitrified Conduit Company will be pleased to hear that it will go out of the hands of the receivers on September 10. This receivership was not on account of any financial difficulty but was due to internal troubles. The company is in a first-class condition in every way and has continued to carry on a rapidly growing business. At present it has on hand some very large contracts for conduit material and is working its factory full time to keep up with the increasing demand for its material.

INDEPENDENT SYSTEM FOR ONTARIO.

DETROIT capitalists have organized a telephone company with an authorized capital of $100,000, and have obtained a charter to do business in the province of Ontario, Canada. They are empowered to carry on the general business of a telephone company, with various restrictions as to the erection of poles and wires, which guard the rights of private and municipal property.

The incorporators are the following: C. W. Taylor, capitalist; R. Brooks, real estate agent; J. A. McRae, grocer; P. T. Chestey, contractor; A. D. Prosser, attorney, all of the City of Detroit. The company proposes to begin its Ontario operations in the County of Essex.

TRI-STATE LETS CONTRACT FOR EXCHANGE AT GRAND FORKS, N. D.

THE contract for the exchange building of the Tri-State Telephone Company at Grand Forks, N. D., has been awarded to Dinnie Brothers.

The building will be thirty-four by fifty feet in size, one story high on high basement, and will be modern in every particular, the plans calling for astructure adapted in every way to the telephone business. It will have a pressed brick front, with stone trimmings, and will cost in the neighborhood of $8,000. Work on the new building will begin at once.

INDEPENDENT TELEPHONES IN CHICAGO.

THE Illinois Tunnel Company is said to have now in service more than 8,000 trunk line telephones. The Chicago Telephone Company has more than 14,000 telephones in the business district, but of this number only a small percentage is trunk line service. The Illinois Company is just beginning to put out extensions and President Wheeler predicts there will be 25,000 instruments in service within twelve months.

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TELEPHONE PATENTS

PARTY LINE RINGING KEY.

J. W. Lattig, of West Bethlehem, and C. L. Goodrum, of Philadelphia, patent (No. 767,573) and assign to the Eastern Telephone Manufacturing Company, of West Chester, a party line ringing key. This invention relates to party line ringing keys whereby it is impractical for the operator to make errors or mistakes in signaling substations. The accompanying diagram gives the circuit concentrically most easily understood by reference to the cord circuit in Fig 2. The inventor provides a

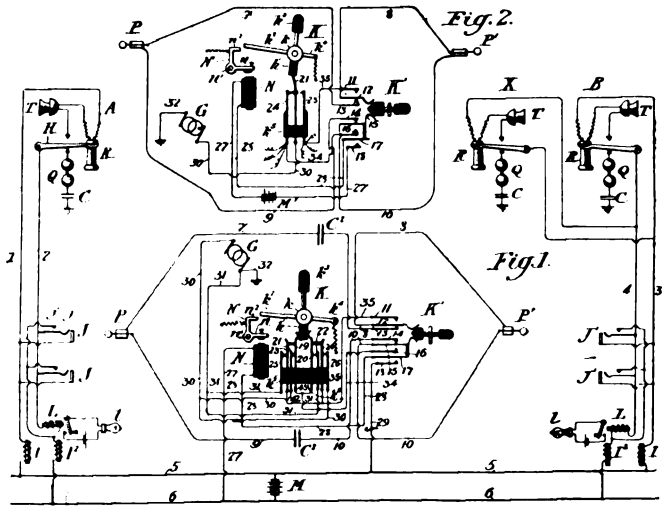


Fig. 2.

Fig. 1.

ringing key, K', and a master-key, K. By means of this master-key, ringing current may be delivered to the ringing key, K', in such a manner as to be sent either on one side or the other side of the line at pleasure. The handle of the key, K, is controlled by a detent, n^2, which is operated by an electromagnet, N. It is evident that whenever the key, K', is pressed the electromagnet, N, will be excited and the key, K, locked. Thus, the operator cannot move the master-key unless all the ringing keys are in the open position.

TELEPHONE EXCHANGE SYSTEM.

Isidor Kitsee, Philadelphia, Pa., patents (No. 766,450) an improved telephone exchange system. This patent is in line with a number of other patents recently issued to Mr. Isidor Kitsee which have been noticed in our columns, the object of all of them being to provide an improved form of switchboard. The present patent is an exceedingly complicated one, requiring a longer explanation than can be afforded in these columns, so that the reader who is interested is recommended to secure a copy of the patent. Briefly, Mr. Kitsee extends telephone lines through a series of plates placed in a shelf or desk before which the operator sits. A number of plugs are provided which carry an incandescent lamp and an electromagnet in the interior thereof. Connection is made by fitting these plugs into holes which are drilled through the plates and thus connecting one line to another. The electromagnetic mechanism in the interior of the plug operates as a signal to inform the operator as to whether parties are calling or desire a disconnection.

MULTIPLEX TELEPHONY.

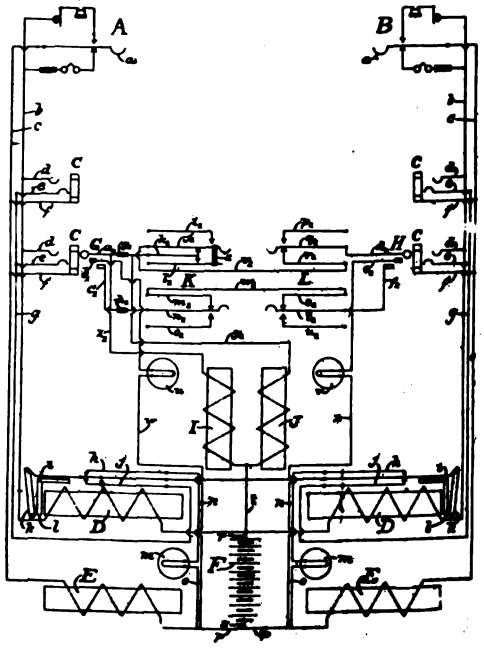
W. M. Miner, of Plainfield, N. J., patents (No. 745,734) an improvement in multiplex telephony. This patent relates to an improvement in multiplex telephony which was recently the subject of another patent granted to the same inventor and which has been noticed in these columns. This system is particularly applicable to the case of long toll lines where there are a number of telephones at each end, that desire to communicate with each other over a considerable distance. Each of the local lines, containing its respective transmitter and receiver, is attached to one segment of a revolving commutator, while the main line is connected to the center of the commutator. As the commutator is revolved each local line is put into communication with the main line for a very small interval of time. In the present patent the inventor describes the result of his experience, which indicates that the commutator must be revolved with such rapidity as to close the circuit between the main line and the local line, with a frequency as great as that of the sound waves in the vowel sounds and over-tones of articulate speech.

TELEPHONIC TRANSMISSION

Isidor Kitsee, of Philadelphia, Pa., patents (No. 766,451) an improved transmission system. The intention of this invention is to improve transmission over telephone lines. The inventor states that according to his experiments he has found that the introduction of condensers in series with a telephone line coupled with induction coils across the line improve its transmission. He does not, however, specify the electrical properties either of the condensers or inductance coils, which he has found preferable for the purpose.

TELEPHONE SYSTEM.

F. B. Parker, Chicago, Ill., patents (No. 767,953) a telephone system. The object of this invention is to provide a common battery circuit in which only one relay is used to operate both the line and supervisory signals. The circuit is shown in the diagram. Relay D is provided with two armatures. When both armatures are attracted the circuit of the line signal is closed. When neither is attracted, the circuit of the supervisory signal



is closed, and when only one armature is attracted neither is closed. It is evidently the intention of the inventor to simplify and cheapen the switchboard circuits but as a retardation coil is employed in both the line and supervisory circuits, it seems that but little improvement has been made in this direction. The inventor specifies that a suitable busy test arrangement shall be used, but inasmuch as one pole of battery is always connected to the ring of the jack, C, and the other pole to the tip of the plug it is difficult to see what would constitute a suitable busy test arrangement.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

CUT-IN JACKS FOR TOLL LINES.—(416.)

Can you give me a circuit for cut in Jacks. I want to bring a toll line to a new station so that the line can be used both ways at the same time.
G. R. L.

The method generally employed is shown in Fig. 416, where *A*, *B* and *C* are three jacks with break contacts, as shown. The trunk from *N* terminates at the outside springs of jack *A* and the trunk from *S* at outside springs of *C*. The inside springs of *A* and *C* are joined together, and the outside springs of *B* are bridged across, while the inside springs connect with the drop or bell *D*.

In operation, if party at *N* wished to call *C* they could do so, al-

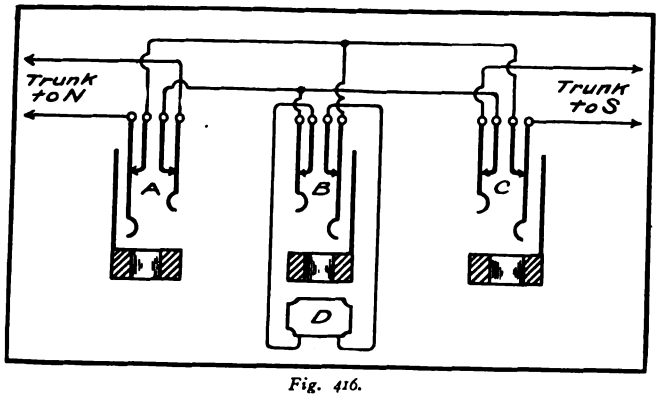

Fig. 416.

though it would be necessary to have some predetermined signal so that *D* would know when they were wanted. Should *D* wish to call *N*, they would insert the plug in the *A* jack, which would cut off the rest of the trunk. Now, if *S* called in the meantime the signal would be received by *D*, who would then plug into *C* and find out what was wanted. *B* is simply a listening jack, and is used when *D* wishes to find out if the line is in use or not, or for testing purposes. It is for the latter reason that the drop is cut out when the plug is inserted in the jack.

CROSS TALK ON GROUNDED LINES.—(417.)

We have several grounded circuits converging at a point about five miles from our switchboard and running thence parallel to the switchboard. Could we overcome the cross talk by running these circuits metallic to the point of divergence and there grounding the return wires, or woulud it be better to terminate the metallic part of the circuits in repeating coils and join on the grounded parts of the circuits through these coils. P. O. S.

The causes of cross talk are often so obscure that it is almost impossible to prescribe an effective remedy. In a general way it is probable that running the circuits metallic the way you sug-

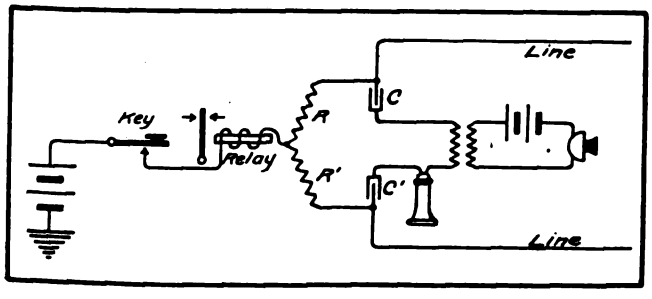

Fig. 419a.

gest will improve matters, though it is impossible to predict that it will cure the cross talk entirely. It is very likely the repeating coil will be an improvement. We would suggest that you try the experiment upon one or two lines and see what results. You can by this means ascertain whether the amount of improvement is sufficient to meet the requirements. The best method is to make all the circuits completely metallic and adequately transpose them. By this means you will undoubtedly obtain entirely satisfactory results.

LOW RESISTANCE DROP.—(418.)

I have a subscriber on a grounded line three-quarters of a mile long. His instrument is a bridging one, 1,600 ohm ringer and heavy fire bar generator. The switchboard drop is 500 ohms. Central can call the party but he cannot throw drop. I put in a 1,600 ohm extension bell at the exchange and find the party is able to ring it. Will you please explain why? O. A. F.

The 1,600-ohm extension bell being wound with fine wire to a high resistance has a great many more ampere turns than the 500-ohm drop, consequently the bell will ring with less current than is required of it through the drop.

RAILROAD COMPOSITE CIRCUIT.—(419.)

Kindly give me a diagram of the composite circuit used by railroads, and oblige. F. H. T.

The diagrams shown in Figs. 419a and 419b are sketches of composite circuits which have been successfully used by the Chicago, Burlington & Quincy; the Illinois Central; Pennsylvania; New York, New Haven & Hartford; Delaware, Lackawanna & Western, and the Lehigh Valley Railroads.

In some cases railways have gone so far as to extend telephone lines from their private exchanges through the signal towers, thus enabling a train to quickly communicate with the despatcher.

The circuits described have often been known as "railway com-

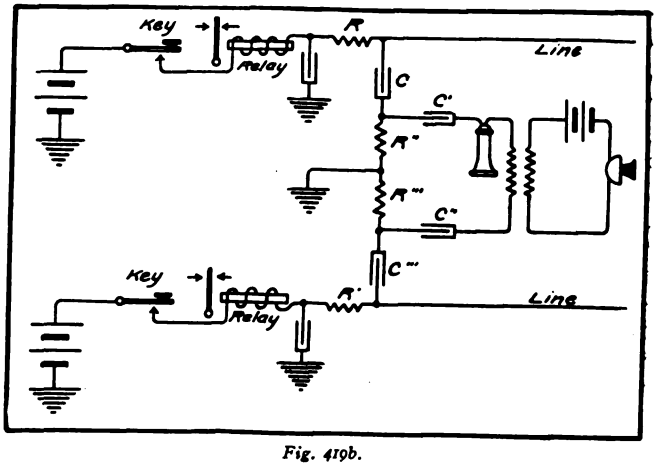

Fig. 419b.

posite circuits." There is a limit to the length of circuit and the number of intermediate offices which can be employed with satisfactory results, and also the impedance coils and condensers must be designed for each case specifically, in order to obtain the best service.

In Fig. 419b each side of the line is worked as a separate telegraph circuit with a grounded return, while both sides of the line are used for telephoning metallically.

In the figure the two sides of the line are shown equipped with keys and relays. *R* and *R'* are adjustable ohmic resistances used to balance the line. *C* and *C''* are condensers placed to prevent the flow of the telegraphic current. *R''* and *R'''* are ohmic resistances which prevent the talking currents flowing to ground or short-circuiting the receiver circuit. *C'* and *C''* are condensers which are intended to help the listening qualities of the line.

Fig. 419a shows a composite circuit designed so that there is one telegraph circuit using both sides of the line for one conductor with a ground return, while the telephone is entirely metallic.

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THE WEEK'S MESSAGES

FINANCIAL.

GENEVA, IND.—The Geneva Telephone Company has increased its capital stock $2,000 for the purpose of making extensions and installing modern equipments. A. G. Briggs, president, and H. M. Aspy, secretary.

GALENA, KANS.—The capital stock of the Galena Telephone Company is $100,000 instead of $10,000, as erroneously stated in a recent issue.

BURLINGTON, WIS.—The Burlington, Rochester and Kansasville Telephone Company has increased its capital stock from $5,000 to $10,000.

FRANCHISES.

BRANTFORD, ONT., CANADA—The Independent Telephone Company, of Chicago, Ill., has asked the city council for a franchise to operate in this city. It has offered the city $200 a year in addition to granting the use of five free telephones.

OLD TOWN, ME.—The city council has granted a franchise to the Automatic Telephone Company to construct and operate a system in the town.

LAKE LINDEN, MICH.—The city council has approved the route for the proposed automatic telephone lines in this village.

OMAHA, NEB.—Lee Herdman will apply for a franchise to operate an Independent system in this city.

KENSAL, N. D.—The Kensal Telephone Company has been granted a franchise by the commissioners of Foster County. The company will extend a line to Carrington.

ASBURY PARK, N. J.—E. H. Snedeker, of the Monmouth Telephone Company, of Monmouth, N. J., has secured a franchise to construct and operate a telephone system in Asbury Park, N. J.

EL PASO, TEX.—R. A. Wooldridge and Charles F. Wren, by their attorney, Leigh Clark, have presented a petition to the city council asking for a franchise to construct and operate an Independent telephone system.

LYNCHBURG, VA.—The Lynchburg Telephone Company will ask the city council in September for a new thirty year franchise.

ELECTIONS.

SHELBYVILLE, ILL.—The Queen City and Shelby County Mutual Telephone Company has elected the following directors: Oscar Bennett, J. F. Ulmer and B. W. Kerr.

HENNIKER, N. H.—At a recent meeting of the Henniker Telephone Company the following officers were elected: George H. Sanborn, president; C. B. Childs, clerk; George H. Sanborn, Dana E. Huntington, W. O. Folsom, L. W. French and Elwin Bacon, directors.

KINGSTON, N. Y.—At a meeting of the stockholders of the Citizens' Standard Telephone Company the following officers were elected: Mortimer C. Drake, president; J. E. Klock, vice-president; Charles Reynolds, Jr., secretary and treasurer; William H. Short, manager.

SCHENECTADY, N. Y.—At a recent meeting of the stockholders of the Home Telephone Company, J. W. Smithley was chosen director in place of E. E. Williams, resigned. The business of the company is constantly increasing, and within the next two or three weeks long distance service will be established with Utica.

RALEIGH, N. C.—C. T. Dahl has been elected treasurer of the Home Telephone Company to succeed L. J. Olson, resigned.

COMBINATIONS.

POSEY, ILL.—George Johnpeter, of this place, has purchased the property of the Southern Union Telephone Company, of this county. The system connects the towns of New Baden, New Memphis, Trenton, Aviston, Breese, Germantown, Buxton, Posey, Hoffman, Huey, Clinton Switch, Keysport and Carlyle. The lines will be extended by the new management.

OSKALOOSA, KANS.—A. B. Clark, of this place, has purchased the Herrington Telephone Exchange. The exchange will probably be remodeled.

ALLEGAN, MICH.—The Citizens' Telephone Company, of Grand Rapids, has purchased the plant of the West Michigan Telephone Company, of this city, formerly operated by Major Cornwell and M. D. Owen. About 300 telephones are operated by this system. Two copper wires will be strung from Grand Rapids to connect with the local system at once.

LAKE WILSON, MINN.—George H. Woodgate, of Slayton, has purchased the T. F. Robinson telephone line, extending from this place to Cameron Township.

ITALY, TEX.—C. M. Mitchell has purchased the telephone exchange at this place from R. B. Lockhart for $5,500.

MORAN, TEX.—Dennis & Son have disposed of the Moran Telephone Exchange to N. H. McElroy.

PERSONAL.

C. H. BREWSTER, late manager of the Michigan State Telephone Company, at the Soo, has been appointed manager for the company at Grand Rapids.

T. S. DODSON has been appointed manager for the Cumberland Telephone and Telegraph Company's plant at Mt. Carmel, Ill.

E. W. HAMMER, president and treasurer of the General Engineering Company, has returned to Chicago for a few days. Mr. Hammer spends the greater portion of his time at Sioux City, in looking after the construction of the automatic exchange of the Sioux City Telephone Company, which is fast nearing completion.

FRANK B. COOK, the well-known manufacturer of protective apparatus and telephone accessories, is on an extended trip through the West, where he will endeavor to secure a well earned rest and recuperate from the rush of work incidental to the enormous business he has done this year. Mr. Cook will go to Denver, Los Angeles, San Francisco and other Coast points, and will probably return by the way of Salt Lake City, also spending some time in the Black Hills, looking into the progress of the telephone company which he owns there. At Salt Lake City he will spend a short time at the plant of the Utah Telephone Company, where he recently installed a main distributing frame equipped with his No. 44 protector. The frame has an ultimate capacity of 4,100 pairs.

NEW COMPANY NOTES.

WASHINGTON, D. C.—A certificate of incorporation of the Home Telephone Company, with a capital stock of $300,000, has been filed here. The incorporators are: George H. Carey, Eugene Schooley and J. Cohencion.

BICKNELL, IND.—The Citizens' Telephone Company, of Bicknell, has been incorporated with a capital stock of $10,000, by R. J. Pickel, J. T. Phillippe, Harmon Buck, J. L. Donellson, E. T. Cox, Charles Harting and W. J. Huff.

GALESBURG, ILL.—The Dahinda Farmers' Telephone Company, of Galesburg, has been incorporated with a capital stock of $1,400, by Samuel Sutherland, Charles Woolacy and J. M. Oberholzor.

KIRKLAND, ILL.—The Farmers Union Telephone Company, of Kirkland, has been incorporated with a capital stock of $2,500 by William Van Wert, John Paulson and W. N. Thompson.

QUINCY, ILL.—The Adams, Pike County & Hannibal Telephone Company has been incorporated with a capital stock of $7,000, by W. H. Breckenridge, John W. Buttz, S. S. Inman, Charles H. Rankin.

ST. JOSEPH, ILL.—The St. Joseph Telephone Company has been incorporated with a capital stock of $18,000. The incorporators are: N. C. Hoyt, U. G. Glasscock and O. C. Bigge.

URBANA, IND.—The Urbana Independent Telephone Company has filed articles of incorporation with the Secretary of State. The capital stock is $10,000. An exchange will be established in Urbana. The directors are: Emanuel Stover, Adam Cook, E. F. Baker and J. C. Schmolzried.

CENTERVILLE, IA.—The Appanoose County Telephone Company has been incorporated with a capital stock of $2,500. The company will build an exchange in this city under the franchise recently given to the Exline Telephone Company. The officers are: Newton Harris, president; A. B. Davison, secretary; Jesse M. Ellis, John A. Cutts, W. J. Jones, J. W. Rinehart, A. H. Baker and J. H. White, directors.

WASHINGTON, KANS.—The Washington Mutual Telephone Company was organized with the following officers and directors: John King, G. Wertman, J. E. Baker, D. A. Kramer, Ira Henry, O. G. Lobaugh.

CALLAWAY, KY.—The Callaway County Independent Telephone Company has been incorporated with a capital stock of $1,000.

MECHANICSVILLE, MD.—The Southern Maryland Telephone Company has been incorporated with a capital stock of $10,000, to operate exchanges in Mechanicsville, Charlotte Hall and Chaptico. The officers are: J. T. Coad, Charlotte Hall, president; L. J. Carter, Charlotte Hall, vice-president, and J. B. Ballinger, Mechanicsville, secretary and treasurer.

KINGMAN, ME.—The North Penobscot Telephone Company has been incorporated with a capital stock of $5,000, to operate systems in Kingman, Prentiss, Carroll, Springfield and Lakeville Plantation. The officers are: H. P. Osgood, of Kingman, president; William A. Blanchard, of Carroll, treasurer.

GRAND LEDGE, MICH.—Residents of Grand Ledge and vicinity are planning for the construction of a telephone system with a capital stock of $10,000.

ARTICHOKE LAKE, MINN.—The Farmers and Merchants' Rural Telephone Company has been incorporated with a capital stock of $10,000. Charles Honson is president; Edward Roberson, vice-president, and Dietrich Chmeckpeper, secretary.

MADISON, MINN.—The Farmers' Mutual Telephone Company, of Lac qui Parle County, has been incorporated with a capital stock of $200,000.

OSCAR, MINN.—The Oscar Telephone Company has been organized and has commenced building its line.

ARLINGTON, NEB.—The Arlington Telephone Company has been incorporated with a capital stock of $10,000, to construct lines in Douglas County.

JEFFERSON, N. H.—The Jefferson Telephone Company has been incorporated with a capital stock of $1,000.

FAIRHAVEN, N. Y.—The Sterling Telephone Company, of Fairhaven, has been incorporated with a capital stock of $960,000. The directors are: F. B. Phillips, Frank Longley and Herbert Grant, of Fairhaven.

NEW YORK, N. Y.—The Alaska Telephone and Telegraph Company, of New York, has been incorporated with a capital stock of $100,000. The directors are: S. E. Boyd, of Nome, Alaska; W. H. Duval, E. D. Church, J. H. Emanuel, Jr., P. V. R. Van Wyck, W. M. Lovering, A. C. Shenstone, W. H. Harding, Jr., H. B. Haigh and John Englis, of New York City.

STAMFORD, N. Y.—The Delaware and Schoharie Telephone Company has been incorporated with a capital stock of $2,000 by H. P. Hubbell, E. W. Landon and M. S. Wood, of Stanford; W. H. Decker, of South Gilboa, and F. P. Jones, R. H. Chaplin and George W. Shelmandine, of Ruth.

DRYDEN, OKLA.—The Dryden Telephone Company has been incorporated with a capital stock of $1,100 by J. S. Campbell, L. D. Perry, J. S. Wilkins, J. D. Le Mar and L. F. Shrewer.

BUTLER, PA.—The People's Telephone Company has been re-chartered with a capital stock of $50,000. The officers are as follows: John Younkins, president; Marion Henshaw, secretary; Thomas Shufflin, treasurer. These, together with John V. Ritts and Albert L. Rieber, constitute the board of directors.

HOLLANDALE, WIS.—The Ridgeway, Jonesville & Hollandale Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are Robert Brunker, William Kramer and Thomas Conway.

LANCASTER, WIS.—The Hickory Grove Farmers' Mutual Telephone Company has been organized to construct a system in the town of Hickory Grove, and has filed articles of incorporation in the county clerk's office. The capital stock is $360, and the incorporators are Charles Kalish, Oaf Hoffland, Joseph Riley, Chris. Colvud and John Lindehier.

MISCELLANEOUS.

ST. JOHN, N. B., CANADA.—The St. John Telephone Company was damaged by fire to the extent of $1,500.

NEW ROCKFORD, N. DAKOTA.—The citizens in Freeborn and Mor-

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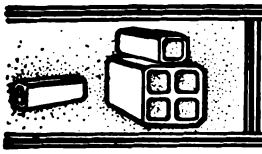
ris are considering the advisability of building a telephone line from this city out into their country.

CHILLICOTHE, OHIO.—Four hundred and fifty of the lines entering the telephone exchange were damaged by a recent electrical storm.

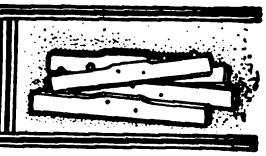
EL PASO, TEXAS.—An Independent telephone company, it is authoritatively announced, will be in operation by December 1st.

UNDERGROUND.

KNOXVILLE, TENN.—The People's Telephone Company has completed the underground work which it is to do for this season. It is the intention to extend the underground system as much or more each summer until all of the business section of the city has been covered and overhead wires and poles shall have been removed. The work of putting in the cables into the recently constructed underground conduits is now being done.



New Construction in the Field



GREENVILLE, ALA.—W. N. Cannon, proprietor of the Greenville Telephone Exchange, is preparing to install a complete new common battery system, entirely re-constructing his old exchange.

KINGMAM, ARIZ.—The Kingman, Nevada and California Telephone Company, which operates in Kingman Needles, and from Manvel to Searchlight, will construct telephone lines to all mining camps in the Nevada, Arizona and Southern California deserts.

DANVILLE, ILL.—The Vermilion County Telephone Company has received four miles of new cable to be used in re-building its system. A new switchboard is being installed.

WAVERLY, IOWA.—A rural telephone line is being constructed between here and Plainfield.

HILLSBORO, ILL.—The People's Mutual Telephone Company is making a large number of improvements and extensions to its system.

SHELBYVILLE, KY.—Representatives of the Home Telephone Company, which was recently granted a franchise, are here preparing plans for the construction of the system.

WASHINGTON, ME.—The Washington Telephone Company has decided to extend its lines to Whitneyville. Arrangements have been made to construct a branch line from Marshfield for about two miles.

LUDINGTON, MICH.—The Lake Shore Telephone Company's full force of pole setters and linemen are at work running a wire from Hesperia to White Cloud.

HERON LAKE, MINN.—The Minnesota Valley Telephone and Telegraph Company will construct an Independent telephone system here.

MEXICO, MEXICO.—The *Mexico Herald* states that Jose Sitzenstatter, of Mexico, instructor of Federal telephone operators in the use of telegraph printing machines, has obtained from the Mexican Government a concession for the installation of a new telephone system in Mexico City. It is stated that the firm of L. M. Ericsson, of Stockholm, Sweden, is one of the syndicates which will back the new concern.

BLUE SPRINGS, NEB.—Plans and specifications for the office building for the Independent Telephone Company have been made. Construction will commence in the near future.

CANASTOTA, N. Y.—Charles J. Wood, of Utica, N. Y., it is understood, has made a proposition to take charge of installing an Independent telephone exchange in Canastota. He is said to be willing to take stock in the exchange and to oversee its construction and operation.

HONEOYE FALLS, N. Y.—The Inter-ocean Telephone Company has just placed a new switchboard in its central office and later will put in a local exchange.

MARATHON, N. Y.—The Farmers' Telephone Company is to be erected from Marathon to Texas Valley.

MILFORD, N. Y.—A local telephone line is contemplated to connect this village to Oneonta.

SODUS, N. Y.—The Wayne-Monroe Telephone Company will extend its lines to cover Wayne and Monroe Counties as far west as Rochester. A line will be run through Ontario County and Cayuga County to Auburn, connecting with all intermediate points as far south as Geneva.

EDINBURG, N. D.—The Edinburg-Gordar Telephone Company will construct a local exchange.

PORTLAND, N. D.—The Red River Valley Telephone Company is building and extending a number of lines west of here.

THOMASVILLE, N. C.—Work has begun on rebuilding the system of the Thomasville Telephone Company at this place. New pole lines and new equipment throughout is to be installed.

BELLAIRE, OHIO.—The stockholders of the Ohio Valley Telephone Company have reorganized by electing W. T. Graham, of New York; J. B. Driggs, Hunter S. Armstrong, George Walters and Charles Rosser, as directors. Mr. Armstrong was elected president, and Mr. Rosser, vice-president, and William Steas, secretary and treasurer. Resolutions were passed providing for the entire reconstruction of the system to begin at once. Option has been taken on a building to serve as general offices. New switchboards will be installed, a new cable system put in, and new wires strung.

IRONTON, OHIO.—The Western Union Central Telephone Company is installing a central energy board here in place of the old transfer board, which has been outgrown.

WEST UNION, OHIO.—The Adams County Telephone Company will construct a line from West Union to Cherry Farm and Winchester.

ALTOONA, PA.—The Hunutingdon and Clearfield Telephone Company at present has a force of men at work extending its lines from Peale to Snowshoe. At the latter place the company will connect with the United Telephone Company's lines, and open up territory in central and eastern Pennsylvania. It is expected to have the new line in operation by the end of August.

BLANDON, PA.—The Pennsylvania Telephone Company is building a telephone line from Blandon to Half-Way House.

BENTLEYVILLE, PA.—The Bentleyville Telephone Company of Bentleyville, is contemplating extending its line into the Vanceville region.

CONNELLSVILLE, PA.—The Tri-State Telephone Company has begun the construction of a line 2½ miles long, from Dawson to Flatwoods.

DUCANNON, PA.—The Perry County Telephone Company has completed its system at New Bloomfield. The system reaches Elliottsburg, Green Park, Loylasville, Landisburg and Alinda.

FOREST CITY, PA.—The Northeastern Pennsylvania Telephone Company has decided to extend a line from Ararat to the Thompson and Gelat Road. Another line will probably be constructed from Winwood to Equimuk.

READING, PA.—The Consolidated Telephone Company has sixty-two men employed in making improvements in West Reading.

WASHINGTON, PA.—The Farmers' Mutual Telephone Company is building a line from this city to Wyland.

HILLSBORO, TEX.—The Hillsboro Telephone Company will install a central energy system within the next month.

LOCHHART, TEX.—The Commercial Telephone Company has arranged to install a telephone system in this city.

VICTORIA, TEX.—Right of way has been granted by the Commissioners' Court for a new telephone line between Victoria and Mission Valley. Citizens of this town will subscribe the necessary amount for the construction of the line.

LYNCHBURG, VA.—W. R. Doss, of Welsh, W. Va., has secured a contract with the Water Department of Lynchburg, to construct a telephone line twenty-five miles long as an auxiliary to the city water supply.

WEBB LAKE, WIS.—Arrangements are being made for the construction of a telephone line from this place to Spooner, to connect with the Swiss line.

LA CROSSE, WIS.—The Tri-State Telephone Company is extending its system from Winona to this city. The work is to be completed about September 1st.

PORTAGE, WIS.—Preliminary steps are being taken toward the establishing of another telephone exchange in this city with rates of $1.50 and $2.50 per month.

RACINE, WIS.—The Badger Telephone and Telegraph Company will construct a toll line from Racine to the Mississippi River, which has the signature of every farmer from Elkhorn to Racine, granting right-of-way to the new line.

BOOK NOTICES.

ELEMENTARY TELEGRAPHY AND TELEPHONY. By Arthur Crotch, Spon and Chamberlain, of New York and London. 223 pages. 238 illustrations. Price, $2.00.

This volume is the latest issue in the Finsbury Technical Manuals. The author states in the preface that the intention of the work is to cover the intermediate ground between electricity and magnetism and the practical applications of telephony and telegraphy. In a sense the volume realizes the claim made for it.

The first ninety-four pages are devoted entirely to elementary lessons in electricity, in which the simplest phenomena of the science are described. Telegraphy is then taken up, and the next eighty-six pages are devoted to an exposition of the various English telegraph systems. The double and single needle instruments are described at considerable length, as well as the various Wheatstone apparatus. Duplex telegraphy receives an extended exposition, and compared to the elementary simplicity in the descriptions of electric and magnetic phenomena the first ninety-four pages, this portion of the work appears to be unduly complex and to lack clearness.

Telephony is taken up in Chapter XVIII., and the entire subject compressed within twenty pages. There is a brief description of Sound Waves, the principle of the magneto receiver, and the Hughes microphone; thence follows a paragraph describing the microphone transmitter and a few cuts of English and German instruments. Considering that the telephone now outrivals the telegraph and embraces a far larger number of subscribers, handling many more messages, and absorbing a notable percentage of the capital invested in all electrical industries, the cursory treatment accorded it in this chapter, appears strange.

The last two chapters are brief expositions, devoted to the construction of telegraph lines and the methods of electrical testing.

As an elementary manual for the Manual Training School, giving a view of telegraphy from the English standpoint, the volume will have a place, but it is not likely to meet the desires or fulfil the expectations of American readers.

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TRADE NOTES

THE S. H. COUCH COMPANY, of Boston, has issued a bulletin on Farmers Line Switchboards, and it will gladly mail a copy to anyone requesting same.

THE CHICAGO INSULATED WIRE COMPANY, of Chicago, keeps a complete stock of weather-proof, annunciator, and magnet wire, cables and galvanized strand at its St. Louis warehouse, and is in a position to make prompt shipment from that point.

THE BAIRD MANUFACTURING COMPANY, 4 Michigan street, Chicago, has designed a new nickle pre-payment coin machine for use on common-battery or magneto telephones. It has a number of striking new features and promises to meet with immediate success.

J. W. MIDDLETON & COMPANY, 167 Dearborn street, Chicago, are putting on the market a new line of postal scales. One in particular is very unique. It combines a postal scale, stamp drawer, pin drawer, ink stamp, and pen rack, all in one. It is made out of the best cold rolled steel and should last a lifetime.

THE KNICKERBOCKER CONSTRUCTION COMPANY, of 15 Cortlandt street, New York, have been awarded the contract for the installation of 5,000 feet of underground cable for the Buffalo, N. Y., Fire Department. The cable is being manufactured by the American Electrical Works, of Philipsdale, R. I., and 26 Cortlandt street, N. Y.

THE WESTERN TELEPHONE MANUFACTURING COMPANY, of Chicago, is complainant in a suit brought against the Williams-Abbott Company, of that city in the United States Circuit Court for an alleged infringement of a patent governing the manufacture of combined annunciators and spring jacks, used in connection with telephone switchboards. A permanent injunction is asked for by the plaintiff, compelling the defendant company to cease making and marketing the articles said to be covered by a patent held by the plaintiffs.

FRANK B. COOK, of 238 West Lake street, Chicago, has been kept busy trying to supply the demand for his type S. S. pole cable terminal, which has jumped into immediate favor. Among others, the Bureau County Telephone Company, with its main office at Princeton, Ill., has installed these terminals in six of its exchanges. These exchanges are located at Princeton, Sheffield, Spring Valley, Tiskilwa, La Moille and Walnut.

THE STERLING ELECTRIC COMPANY, Lafayette, Ind., reports a steadily increasing demand for its well known type of common-battery Bell type switchboards. It has recently installed telephone equipment for the following companies: Johnson City, Ill.; Sebewaing, Mich.; Cerro Gordo, Ill.; Portland, Ind.; Bloomington, Ind.; Winona, Minn.; Charleston, Ill.; Cheboygan, Mich.; Monmouth, Ill.; Shreveport, La.; Bay City, Mich.; Erie, Pa.

THE CALCULAGRAPH COMPANY OF AMERICA secured an opinion from Judge Hale on August 16, in the Circuit Court of the United States, District of Massachusetts, in its suit against John C. Wilson, doing business as the Automatic Time Stamp Company, for infringement of two patents numbered 424291 and 583320, owned by the Calculagraph Company, in the manufacture and sale by the defendant of the machine styled the "Timometer." The decision holds that the two patents in suit are valid and that claims of both have been infringed by the defendant in his machine. A decree is entered for the complainant for a permanent injunction, and for an accounting with costs.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY is at present building five complete common battery equipments, to be used in New York State. It has also under construction a number of other switchboards, including both common battery, magneto drop and battery call magneto switchboards for different exchanges in other States. The company has been exceptionally busy during the summer months and its business is rapidly increasing. One of the switchboards it is building is a 1,500 line multiple common battery lamp signal switchboard in a 3,600 line cabinet, is constructed on an entirely new principle, which will add greatly to the efficiency of an exchange and reduce the maintenance and amount of floor space required considerably, both of which mean an actual saving of money to exchanges using this equipment. The company will be pleased to send details regarding the above switchboard and its construction.

THE NATIONAL BATTERY COMPANY, of Buffalo and New York City, has recently made arrangements for the extensive enlargement of its factory, which has become necessary on account of the rapid growth of its business. The history of this factory is unique. It was originally put into the "Trust," known as the American Bicycle Company, which later became the Pope Manufacturing Company, and from them the entire capital stock has been purchased by individuals, who are, at the present time, so improving the interior arrangements that all the manufacturing methods and systems will be thoroughly up-to-date. Electric elevators, trolley car lines, etc., will equip the factory, carrying the heaviest product handled rapidly from place to place. The chemical and electrical laboratories have been greatly increased in size, and are being equipped with the very latest types in every variety of instruments required for experimental work. The spirit of the new ownership and management is bold and aggressive, having at its command all the capital and resources that will be required to make the company a success, and they are pushing on as rapidly as it is possible to go. The largest product of the factory is batteries for power plants and various kinds of stationary work. After this, the railroad and telephone batteries are the important product. There are only a very few manufacturers of electric storage batteries in this country (in fact, they number less than a half dozen), but of the number, the National Battery Company is one of the most active. This company will always be most willing to answer all communications in respect to its product.

WANTED

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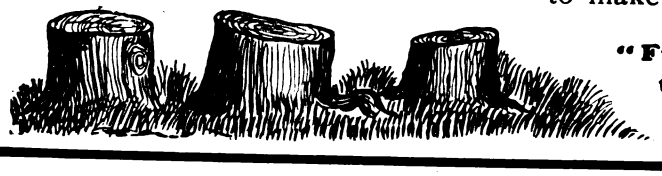

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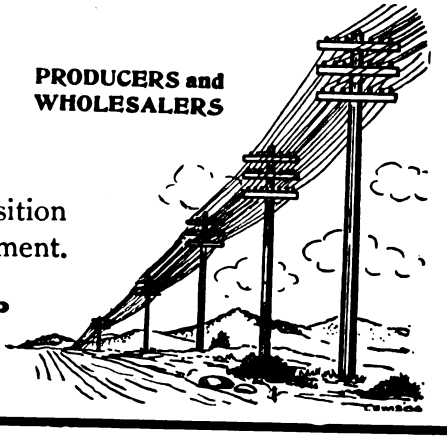

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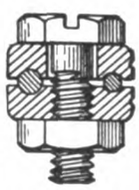

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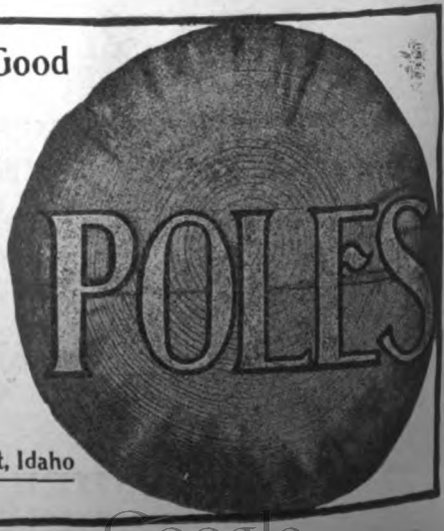

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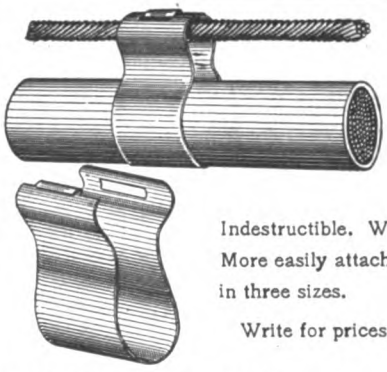

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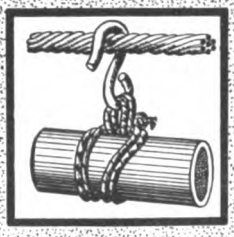

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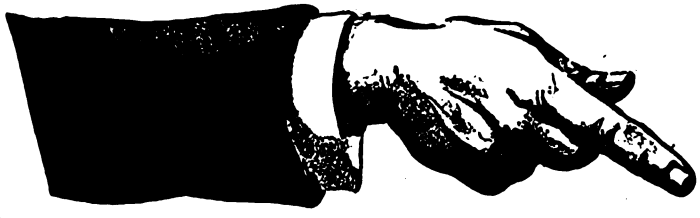

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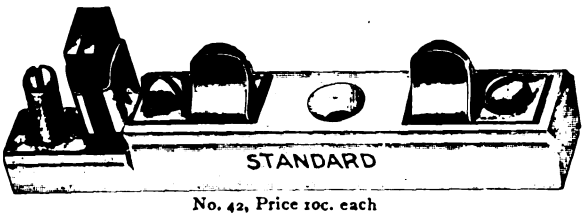

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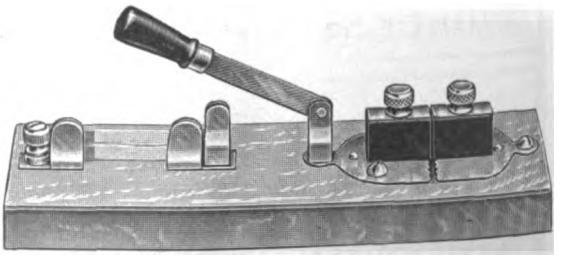

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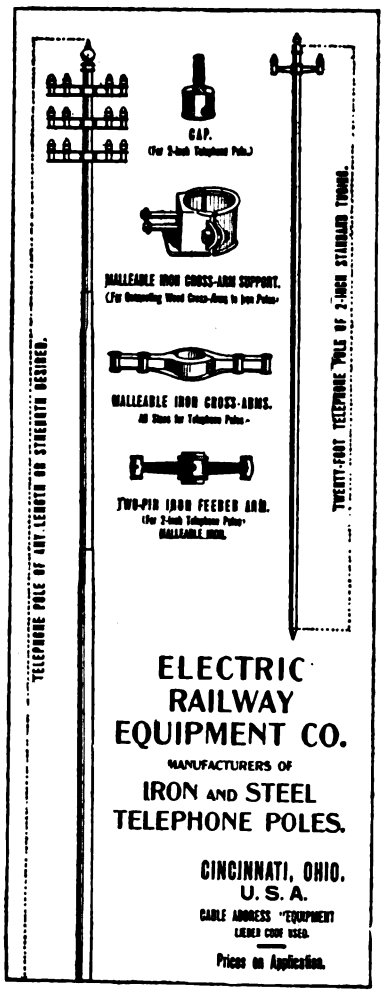

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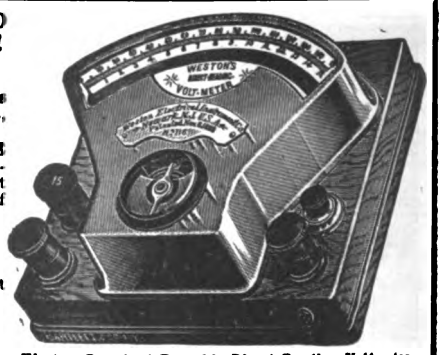

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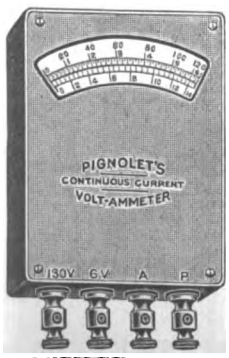

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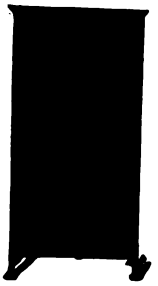

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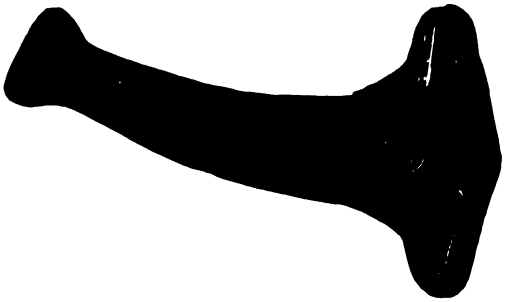

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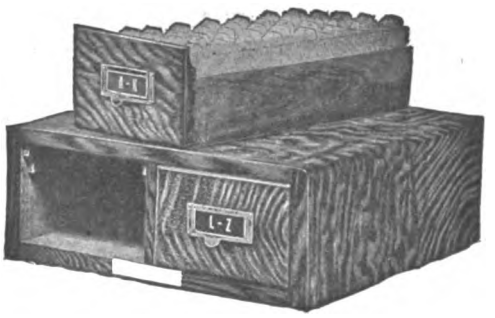

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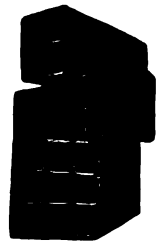

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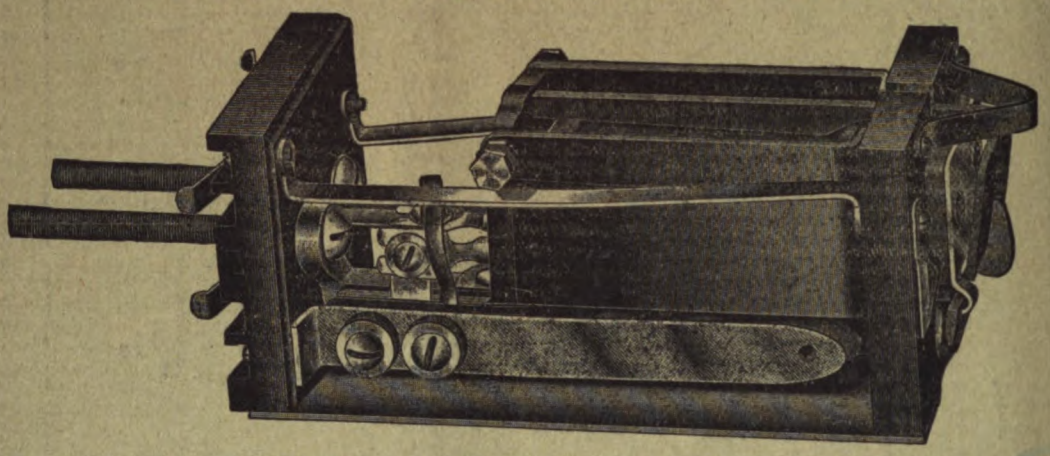

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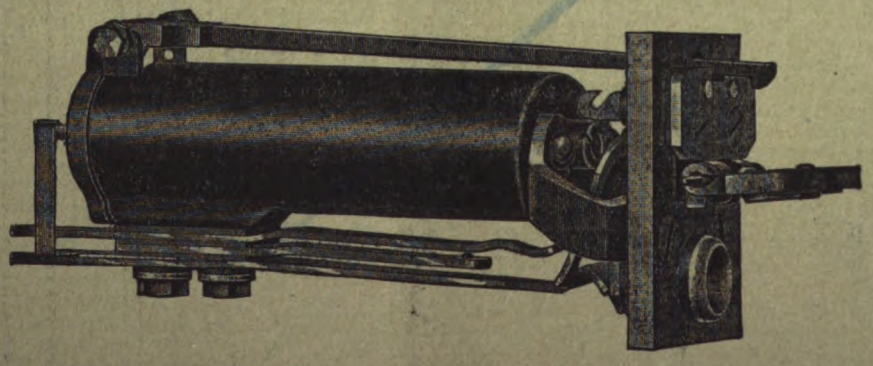

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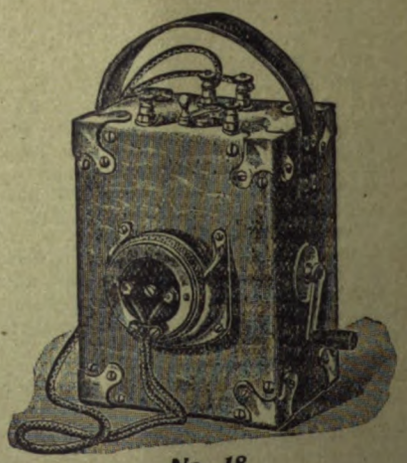

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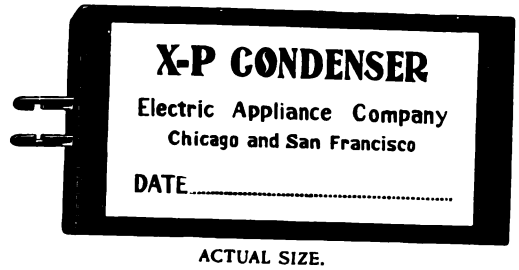

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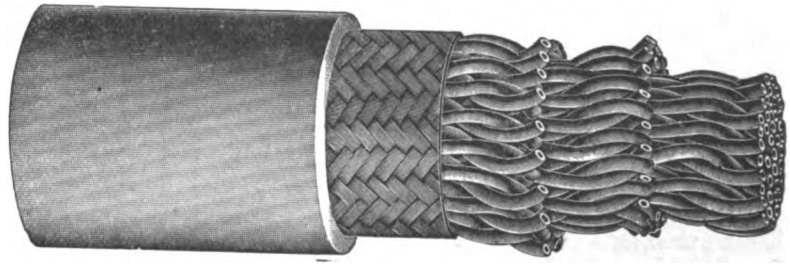

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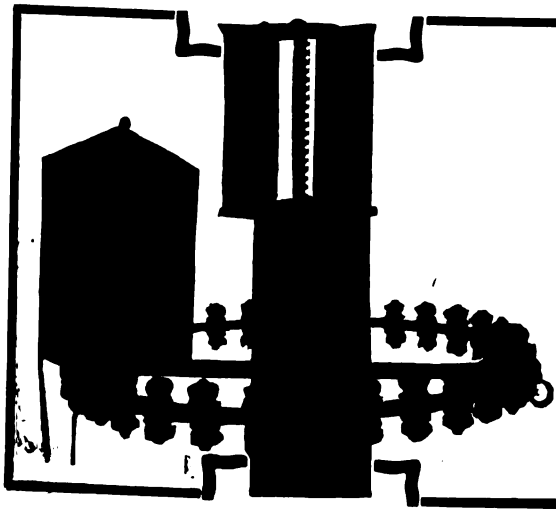

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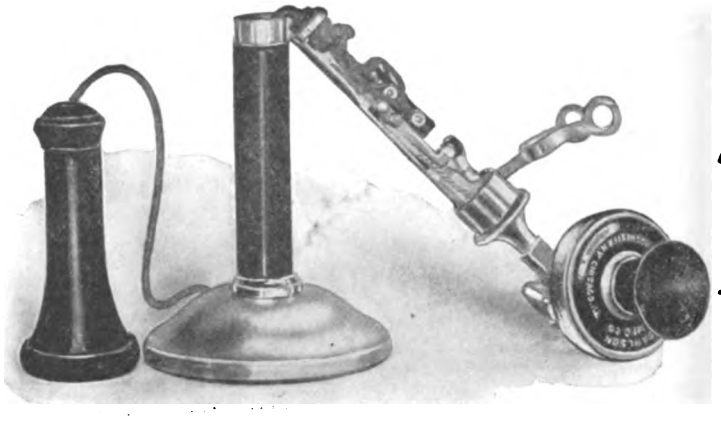

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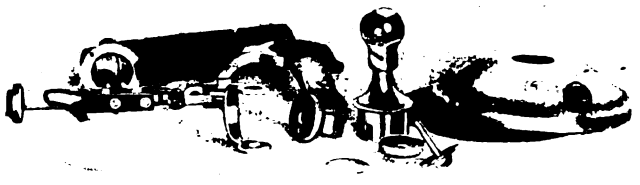

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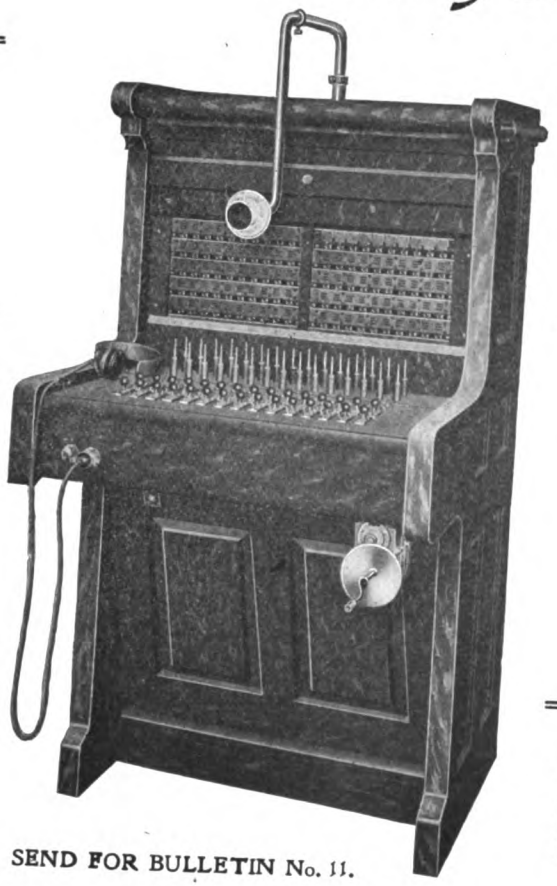

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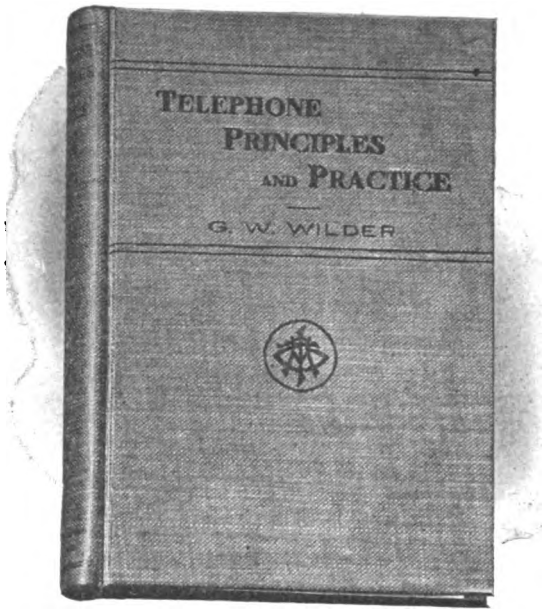

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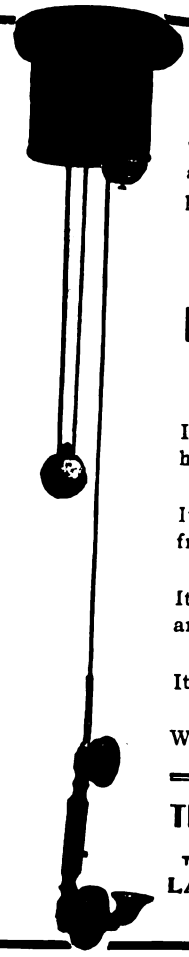

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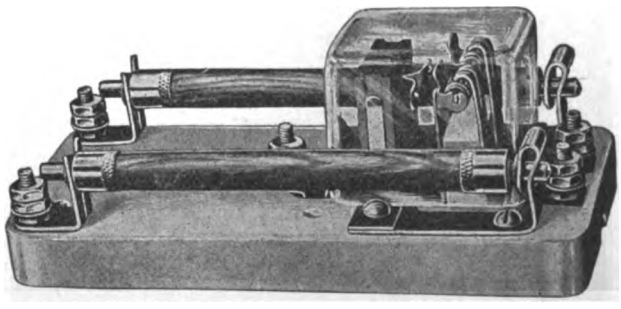

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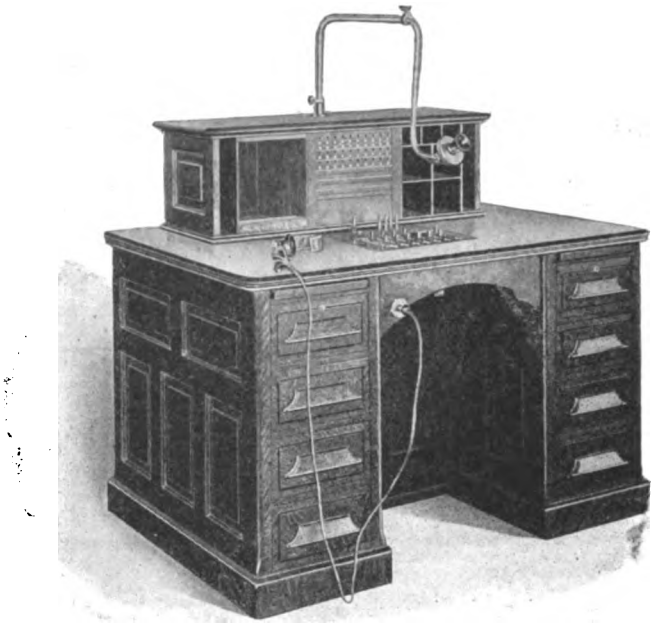

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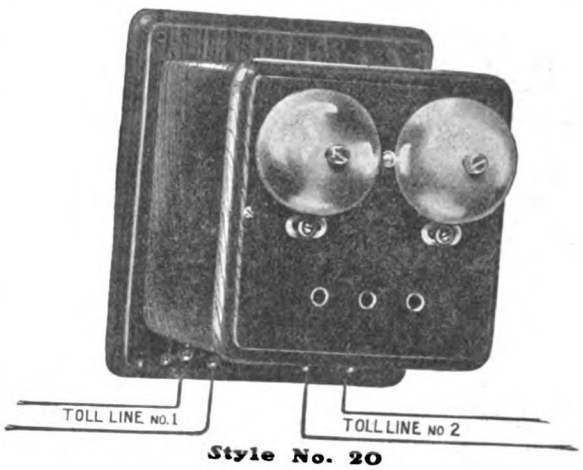

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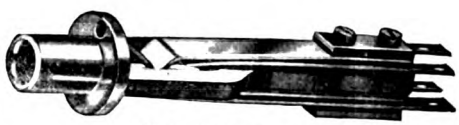

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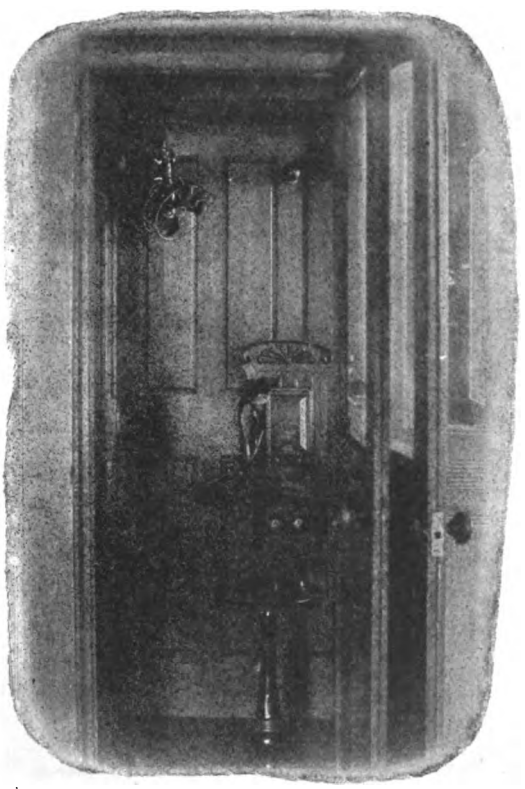

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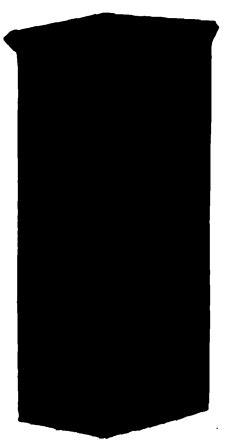

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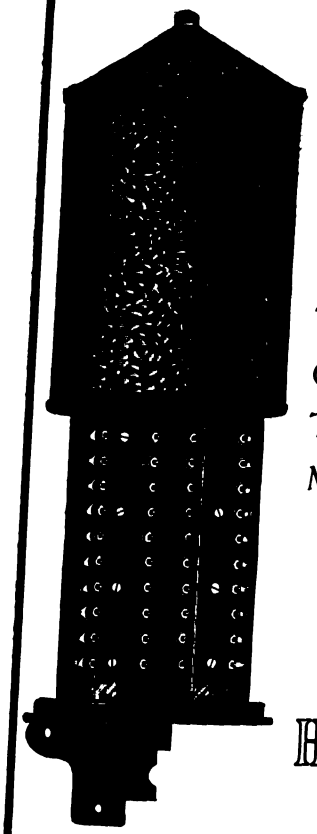

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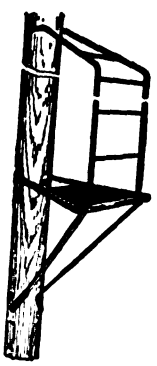

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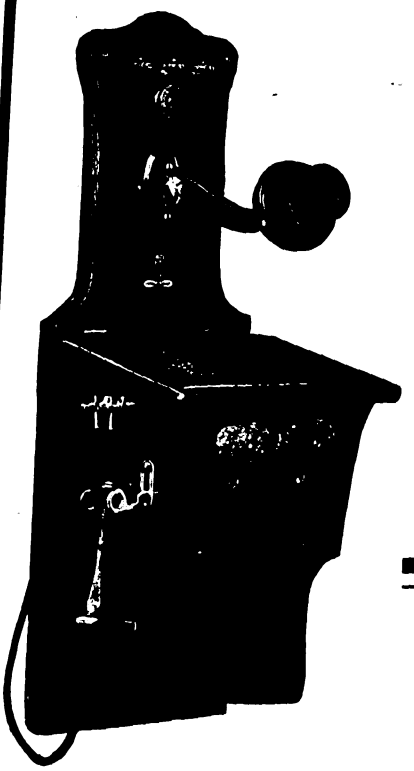

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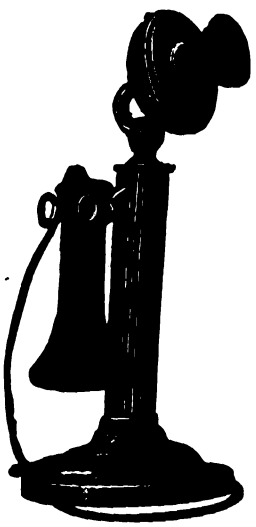

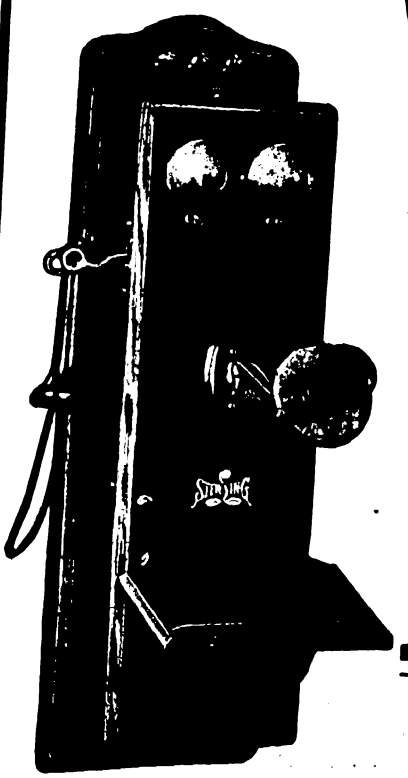

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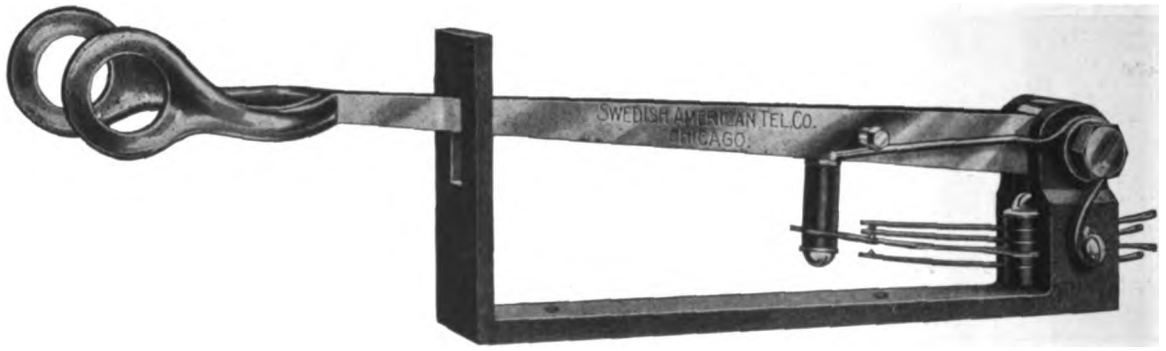

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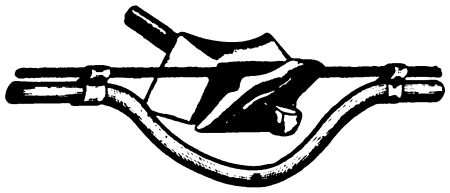

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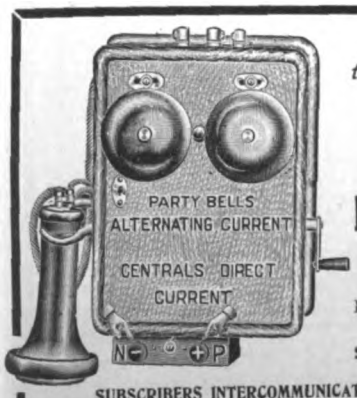

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TELEPHONE EXCHANGE ENGINEERING

ARTICLE XIX.—CONDENSERS

By Ray H. Manson, Albion D. T. Libby, and Charles A. Simpson.

A CONDENSER is a piece of apparatus for storing electrical energy in the form of a static charge. It is unlike the storage battery, which stores electrical energy by a chemical change, in that the charge is retained in electrical form.

The principle of the condenser is shown in Fig. 76, where *a* and *b* are two conducting plates of metal, such as tinfoil, and *c*

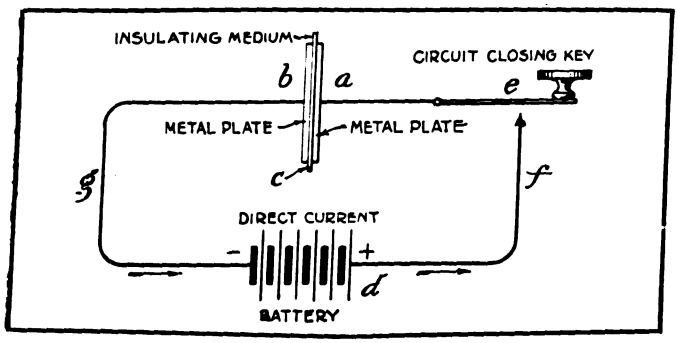

Fig. 76. Electrical Condenser in a Direct-Current Circuit.

an air space or sheet of insulating material. This separating medium is known as the *dielectric*, and in a commercial condenser is generally paraffined paper, mica or glass.

Condenser in a Direct Current Circuit.—If the plates *a* and *b* (Fig. 76), are connected to a direct-current source of electricity, such as the battery *d*, and the key *e* closed, current will flow and charge plate *a* positively and *b* negatively. When the key is

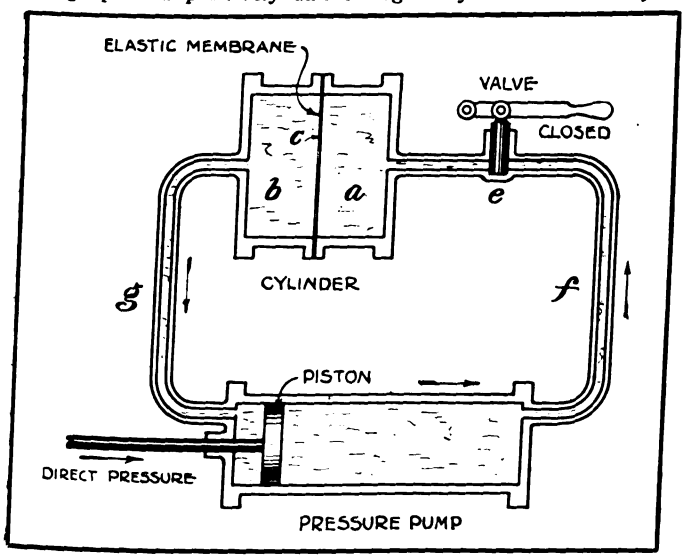

Fig. 77. Liquid Analogy of a Condenser in a Direct-Current Circuit.

opened the condenser remains charged, provided the insulation is perfect. It can be readily discharged by connecting plates *a* and *b* by a suitable conductor, such as wire.

Possibly the best way to illustrate condenser action is by a familiar water analogy. Electricity acts as an incompressible liquid, and can for convenience be taken as such. Water is more or less compressible, so in the following illustrations an *incompressible liquid* will be taken instead.

In the case of electricity, if a battery, or generator, is forcing

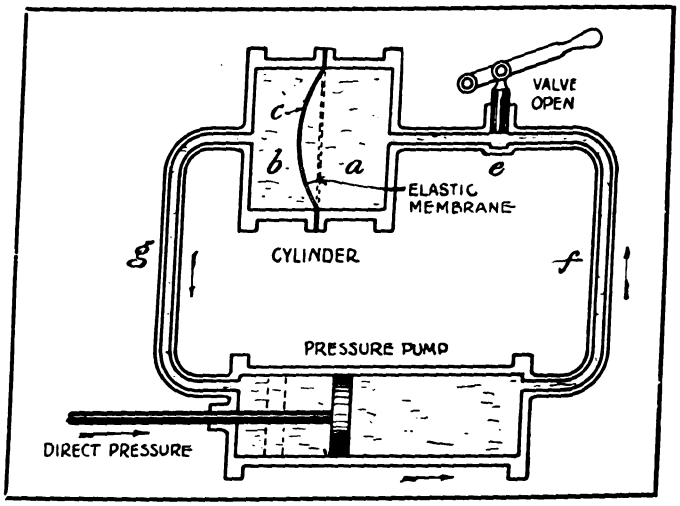

Fig. 78. Liquid Analogy of a Charged Condenser in a Direct-Current Circuit.

current out of its positive (+) pole, an equal amount must come in at the negative (—) pole. Also if the circuit is opened so that the current cannot flow in, it ceases to flow out.

Fig. 77 is a liquid circuit, made to operate similarly to the electrical circuit (Fig. 76). The pump corresponds to the battery, the cylinder to the condenser, the valve to the key and the connecting pipes to the wires. The dielectric is represented by an elastic membrance *c*, separating the cylinder into two parts, *a* and *b*.

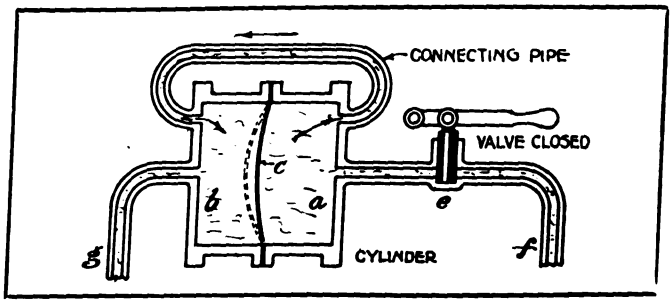

Fig. 79. Liquid Analogy of a Condenser Being Discharged.

Consider the pump, pipes and cylinder filled with the incompressible liquid. With the valve *e* closed, no liquid can flow into *a*, and thus the diaphragm *c* cannot move. This is the case in Fig. 76 with the key *e* open. Now with a certain direct pressure on the pump piston, and with the valve open, liquid will flow into *a* and an equal amount out of *b*, as shown in Fig. 78. The amount of liquid which it is possible to force into *a* depends on the pressure at the pump and the tension of the diaphragm, or in other words, when the elastic force of the diaphragm exerts a back pressure equal to the pressure at the pump, the motion of the liquid will cease. The operation of the electrical condenser in

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Fig. 76 is similar. Electric current will flow from the battery into the condenser until the potential difference of the plates *a* and *b* become equal to the electrical pressure (electromotive force) of the battery producing the current.

With the cylinder charged and with the valve *e* closed, it is only possible to restore the pressure in the cylinder to normal by connecting *a* to *b* as shown in Fig. 79. The elasticity of the diaphragm *c* will force the liquid from *a* to *b*. This is equivalent to discharging the electrical condenser (Fig. 76) by connecting

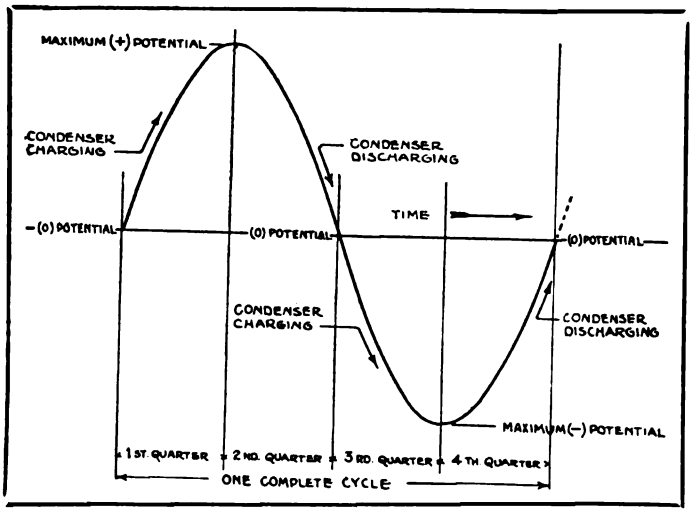

Fig. 80. Graphical Representation of One Complete Alternating-Current Cycle, Showing the Condenser Action.

the plates when the battery key is open. Any leakage in the cylinder, from *a* to *b* (Fig. 76), due to poor insulation, will eventually discharge the condenser, and as there is no perfect insulator at all, electrical condensers will slowly lose their charge, regardless of how well insulated its plates may be, and however dry the surrounding air. Insulation leakage losses are of great importance in commercial work.

Condenser in an Alternating Current Circuit.—If a condenser be connected to a source of alternating current, it will be charged to a potential equal to the maximum applied pressure (E. M. F.) during the first quarter of a cycle, discharged during the second quarter, charged again, but in the opposite direction

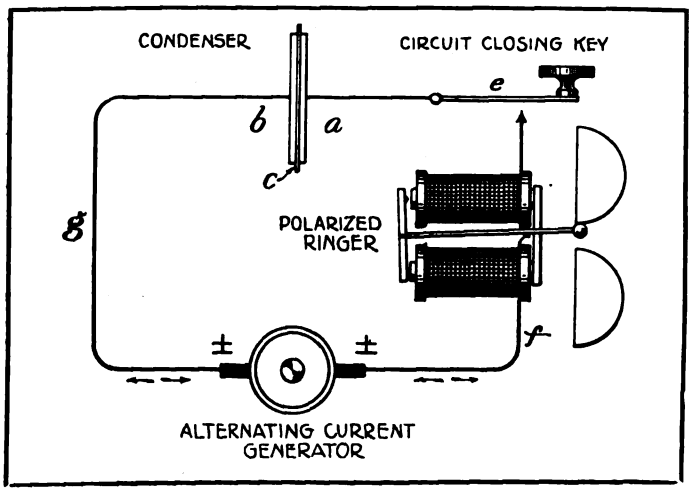

Fig. 81. Electrical Condenser and Polarized Bell in an Alternating-Current Circuit.

during the third quarter of the cycle, and discharged during the fourth quarter. This action, shown graphically in Fig. 80, will continue as long as the condenser remains in the circuit, and the source of alternating current continues to operate. Current will flow in the circuit wires just as though the plates of the condenser were connected together, due to the rapid charging and discharging. The presence of this alternating current is made evident by inserting a polarized electric bell (one designed to operate on alternating current) in the circuit, as shown in Fig. 81. When the key *e* is closed, thereby allowing the condenser to charge and discharge with the alternating current, the bell will be operated.

If a battery (direct current) was substituted in Fig. 81 for the alternating generator (alternating current) and the key *e* closed, there would be only one rush of current, sufficient to charge the condenser. This rush of current would have a tendency to tap the bell, provided the armature of the latter was in proper position to receive the electrical impulse. A discharge of the condenser through the bell would tend to throw the armature in the other direction, so that either the charge or discharge will tap the bell, unless some means is employed to prevent it. In central bat-

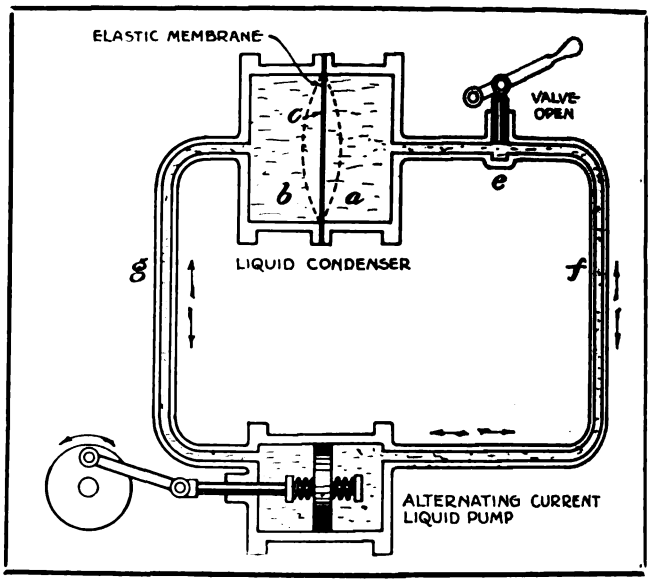

Fig. 82. Liquid Analogy of a Condenser in an Alternating-Current Circuit.

tery telephone working this action often causes much trouble and annoyance.

Returning again to the liquid analogy, it will only be necessary to impart a reciprocating motion to the pump piston, as shown in Fig. 82, in order to produce an effect similar to an alternating current. The motion of the piston forces the liquid, first into *a* and out of *b*, until the diaphragm *c* is extended to a point where its elastic force balances the pressure of the pump piston; then upon the return stroke, the liquid is forced into *b* and out of *a*, until

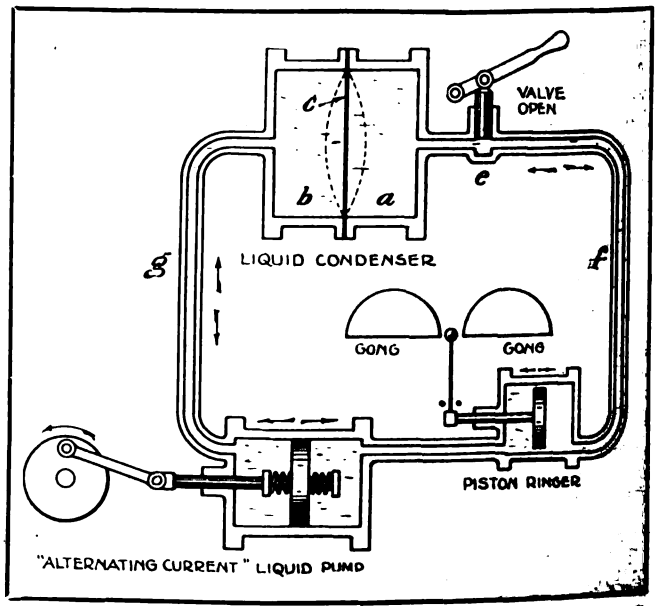

Fig. 83. Liquid Analogy of a Condenser in an Alternating-Current Circuit, With a Mechanism to Show the Movement of the Liquid.

the diaphragm *c* again balances the pump pressure. This cycle of operations continues as long as the valve remains open.

Now if a loose piston is inserted anywhere in the pipe circuit (Fig. 83), it will move back and forth with the movement of the liquid, and can be made to produce useful work, such as ring a bell. This bell acts in a similar manner to the one shown in the electrical circuit (Fig. 81).

Unit of Capacity.—The capacity of a condenser is defined as the quantity of electricity which must be imparted to it in order to produce a difference of potential of one volt between the plates.

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The unit of capacity is called the *farad*; being the capacity of such a condenser as will be changed to a potential of one volt by one ampere of electricity in one second. In practice a condenser of one farad capacity would be too enormous to be constructed. It would take over 500,000 standard size telephone condensers to give a capacity of one farad. If these condensers were placed end to end their combined length would be over 852 miles.

A *practical unit* of capacity is therefore chosen, the micro-farad, or one-millionth of a farad. A one micro-farad telephone condenser contains about 2,400 square inches of tinfoil, with a dielectric of paraffined rice paper.

The capacity of a condenser depends upon: (1) The area of the facing surfaces of its plates; (2) The thickness of the dielectric medium between them; and (3) The dielectric capacity of the separating medium.

The dielectric materials have various powers of conveying the electrical influence of one plate to the other. This power of air as a dielectric is usually taken as unity, and that of other substances compared to it. For example, if two condensers are of exactly the same size, and in one of them the dielectric be a layer of air, and in the other a layer of paraffin, it will be found that equal quantities of electricity imparted to them do not produce

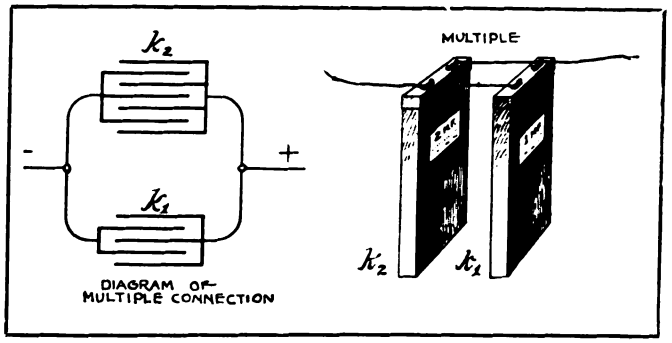

Fig. 84. Condensers in Parallel. The Joint Capacity is Equal to the Sum of the Separate Capacities.

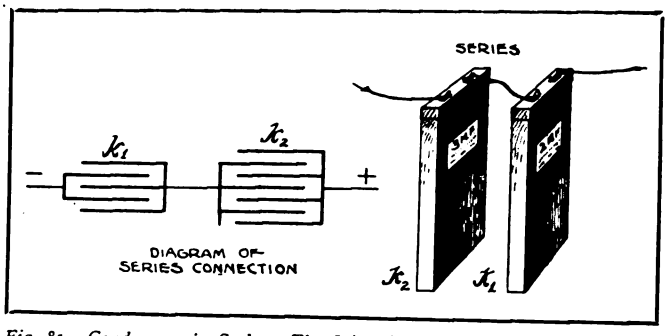

Fig. 85. Condensers in Series. The Joint Capacity is Less than Either of Them Separately.

equal differences of potential; or, in other words, it is found that they have not the same capacity. The capacity of the condenser with the paraffin dielectric will be about twice that of the air dielectric condenser. The following table gives the dielectric capacity (sometimes called specific inductive capacity) of several substances used in condenser construction:

Dry air (taken as standard of comparison)	1.00
Wax	1.85
Paraffin	1.92 to 2.47
Hard rubber	2.25
Shellac	2.74 to 2.95
Glass (hard and new)	3.10 to 10.00
Mica	5.00 to 8.00
Rice paper, paraffined, about	8.00

CAPACITY FORMULA.—The capacity of a condenser can be computed from the formula,

$$\text{Capacity, in microfarads, } C = 0.000000225 \frac{A\ k}{t},$$

where A is the area of one of the two plates in square inches; k the dielectric capacity, as given in the accompanying table, and t the thickness of the dielectric material, provided the plates are in close contact with it.

Example: What capacity will be obtained with a condenser made from tinfoil plates, each having 2,500 square inches of surface, and with a paraffined rice-paper dielectric 0.00225 of an inch thick?

$$C = 0.000000225 \frac{2500 \times 8}{0.00225} = 2 \text{ microfarads.}$$

These figures correspond to the specifications of one make of telephone condensers.

CONDENSER REACTANCE.—A condenser offers an apparent resistance to alternating current flow, depending on the frequency of the current and the capacity of the condenser. This property is called the reactance of the condenser and is expressed in ohms. The relation of capacity, frequency and reactance is given in the formula,

$$y = \frac{1}{0.0000062832\ f\ c}$$

where y is the reactance expressed in ohms, f the alternating current frequency (complete alternations per second), and c the capacity in microfarads.

A standard two-pole ringing generator is designed to operate at 1000 r. p. m., thus giving an alternating current of 16.66 complete alternations per second. The resistance of a two microfarad condenser when subjected to this current will be,

$$y = \frac{1}{0.0000062832 \times 16.66 \times 2} = 5000 \text{ ohms, approximately.}$$

Voice currents, which have a frequency of about 250 per second, meet with only 318 ohms resistance in a two-microfarad condenser.

The reactance formula also shows that a variation in capacity will change the resistance values. Thus with a one-microfarad condenser the values given in the above examples will be doubled. The ringing current will be resisted by 10,000 ohms and the voice currents by 636 ohms.

CONDENSERS IN PARALLEL.—If several condensers are joined together in parallel as shown in Fig. 84, they will act like one large condenser of a capacity equal to the sum of the separate capacities.

For example, a two-microfarad condenser connected in parallel to a one-microfarad condenser will give a joint capacity of three microfarads. The result is a condenser of larger plate area.

CONDENSERS IN SERIES.—If condensers are joined in series, as shown in Fig. 85, they will act as a condenser having a lesser capacity than either of them separately. The joint capacities in this case will be the reciprocal of the sum of the reciprocals of their capacities separately.

If two condensers, respectively 2 and 3 microfarads, are joined in series their joint capacity will be,

$$k_3 = \frac{1}{\frac{1}{k_1}+\frac{1}{k_2}} = \frac{1}{\frac{1}{2}+\frac{1}{3}} = 1\frac{1}{5} \text{ microfarads.}$$

A NOVEL USE FOR THE TELEPHONE.

ANOTHER illustration of the many uses to which a telephone can be placed is forthcoming from Paducah, Ky. It had been decided to paint the inside of a large standpipe belonging to the water company. To do this a raft was constructed to float upon the water within the pipe and serve as a platform on which the painters might work. A telephone was installed within the tube and connected with the pump room of the plant. When the men had painted as far as they could they would signal the engineer to raise or lower the level of the water as desired. In this way a great deal of time was saved as well as the cost of staging which had previously been used.

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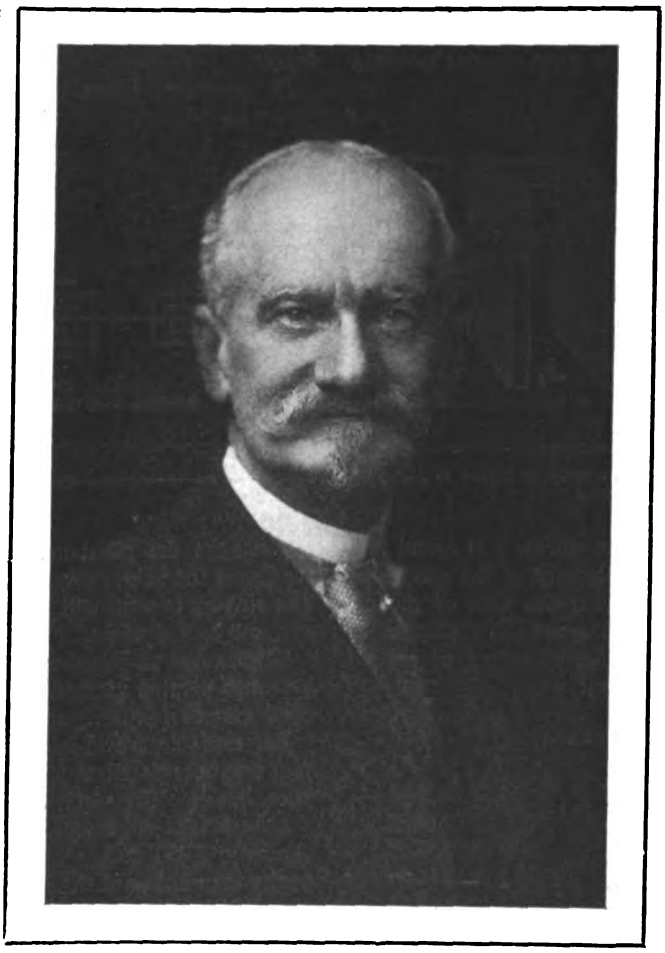
F. S. DICKSON AND HIS WORK WITH THE INDEPENDENTS

By E. C. Hopwood.

ONE of the prominent figures in Independent telephone circles of the Middle West is Frederick S. Dickson, president of the Cuyahoga, Federal and United States telephone companies. In addition to the ability to manage successfully these three corporations and look after the detail of a dozen subsidiary companies, Mr. Dickson has a personality so unique and striking that many of the things he has done have attracted widespread attention.

A word about the man's life is interesting. He was the son of Rev. Hugh S. Dickson and Sarah Stoever Dickson, and was born at Utica, N. Y., in 1850. His father was pastor of the Westminster Presbyterian church at Utica at the time. Later the family went to Philadelphia.



F. S. Dickson, President of the Cuyahoga Telephone Company.

Frederick Dickson entered the Sheffield Scientific School at Yale and was graduated in the class of 1871. He then took up the study of law and was admitted to the bar in 1873. Before this he had written "An Analysis of Blackstonestone's Commentaries," published in 1874. He is also the author of several other works, among them being a book on outdoor life, called "And the Wilderness Blossomed," published in 1901, and recommended by the New York Library Association.

In 1879 Mr. Dickson abandoned the law and entered business with John Wanamaker. Six years later "The Solicitors Co.," a Philadelphia corporation, was formed, of which Dickson became president, but, disagreeing with the controlling interests, shortly resigned. In 1893 he was made president of "The Abrasive Material Company," a corporation of which he is still the head.

In January, 1902, Mr. Dickson, as representative of the John A. Roeblings Sons Company and other creditors of the Everett-Moore syndicate, came to Cleveland. The Independent Telephone interests centering in Cleveland were in thorny ways; as a part of the syndicate they suffered from the embarrassment in which it found itself.

Mr. Dickson and George W. Beers, of Ft. Wayne, looked over the telephone properties and reported favorably to the bankers' committee in charge of the syndicate's affairs, and on October 27, 1902, he became president of the Cuyahoga and Federal Telephone Companies, to succeed Henry A. Everett.

He is one of the most strenuous of business men, and, with this energy fortified by his legal, scientific and business training, he went to work. The steps whereby he evolved order out of the chaos in which he found the companies' affairs were taken unhesitatingly and wisely. On May 21, 1903, he reported to the stockholders of the Cuyahoga Telephone Company as follows: "At our annual meeting in February we reported a deficit carried over from the past of $29,684. On the first of February this deficit had been reduced to $23,382; on March 1 to $16,801; on April 1 to $9,089, and on May 1 to $1,971. The first of June will, doubtless, show a surplus and this we hope to increase in the future." Mr. Dickson proved to be a good prophet, for the next month did show a surplus, which has been increasing constantly. What he did for the Cuyahoga Company he did for the other companies with which he was connected and, aided by the able assistants with which he surrounded himself, he infused new life into the Independent telephone business in Cleveland.

As soon as the Cuyahoga Company began to earn a surplus Mr. Dickson put into operation his profit-sharing project, a system of which he has always been an advocate. It was tried in Cleveland with the employees of the Cuyahoga Company for the last six months of 1903 as an experiment. The letter he wrote to the employees announcing the plan was characteristic in the extreme. The substance is as follows:

"Dear People—I am not quite satisfied with your work. I do not think it is very bad, but I am sure it is not as good as it could be and, therefore, is not as good as it ought to be. You are doing pretty well, but you are not doing your best. You know this business was started so that it might earn money for those who have invested money in it. Now, money can be made out of this business if good service is rendered to our customers, but the character of the service will depend upon the character of your work. If your work is good, the service will be good. If you are patient, polite, prompt and skilful you can give very good service with second-rate equipment, but if you are petulant, rude, dilatory and careless the service will be poor, even if we have the best equipment in the world.

"Now, I want all of you to feel that each of you have a real interest in the success of this company. I want every one of you to smile when you hear the company praised for the character of its service, and to take to yourselves part of the credit for making the service good. Remember, if we have careless employees, it will reduce our profits. If we have any employees who shirk their full duty, it will reduce our profits. If calls are not answered promptly, our subscribers will leave us and there will be no profits. If our solicitors are not active, we cannot increase our business. If our collectors are negligent, or show want of tact, we will not get paid even for the service we have rendered. We are bound close together, whether we like it or not, and the failure of one to do his full duty renders worthless the honest labor of others. Whether we make good profits, or none at all, will depend upon the way your work is done, therefore, I feel that if you honestly help us to earn money, you should honestly share in the money earned, just as you have shared in the labor."

Mr. Dickson then outlined his plan, which was to set aside

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one-fifth of the surplus remaining at the end of six months, after expenses, taxes and interest on bonds were paid, to be shared by the employees in proportion to their salaries. A good deal of Mr. Dickson's gospel was contained in the following paragraph:

"Remember, the easiest way to make money is not to spend it. Do you realize that all of you are spending money for us? If you injure any part of our apparatus, you have spent the money it costs to repair it. If you cut wire to waste, you have spent the difference in value between good copper wire and junk. If you use a good sheet of paper to figure on, where the back of an old envelope would serve as well, you have added to the cost of operating this plant."

The employees took up the plan with a will and it proved so satisfactory that it was made permanent by the stockholders.

Mr. Dickson led the Independents in and won the fight against Postmaster General Payne's order barring Independent telephones from being used in the postoffices of the United States.

Under Mr. Dickson's administration the Cuyahoga Company has added one of the finest switchboards in the country to its equipment. An active campaign for business has begun and the list of subscribers is growing rapidly. Extensions and betterments are constantly being made to the Federal and United States Companies and the whole Independent situation is in a healthy and prosperous condition. To give the best service at a fair rate has been the aim of President Dickson and his associates, and the reports of the various companies seem to indicate the success that has followed.

Personally, Mr. Dickson is one of the pleasantest men to meet. He is the embodiment of nervous energy and has the reputation of being the hardest working corporation president in Cleveland. Generous and considerate with his employees, he insists on the best in them in return, and those who attempt devious or dilatory tactics are soon looking for something or someone else to do.

MAINTENANCE

ARTICLE II.

By Arthur Benson.

"OPENS."—Generally speaking, where an open-wire line is open, either on one or both sides, the fact can be determined by noting that communication cannot be established between the two terminal points. On long lines, however, where peculiar conditions exist, communication can be carried on when the line is open on only one side. This point will be discussed later.

The method adopted for clearing "opens," whether swinging or otherwise, or whether on one or both sides of the line, is as follows: A line having been tested from the exchange and found to be open, the point at which the trouble is located is found by making successive attempts to communicate with the ex-

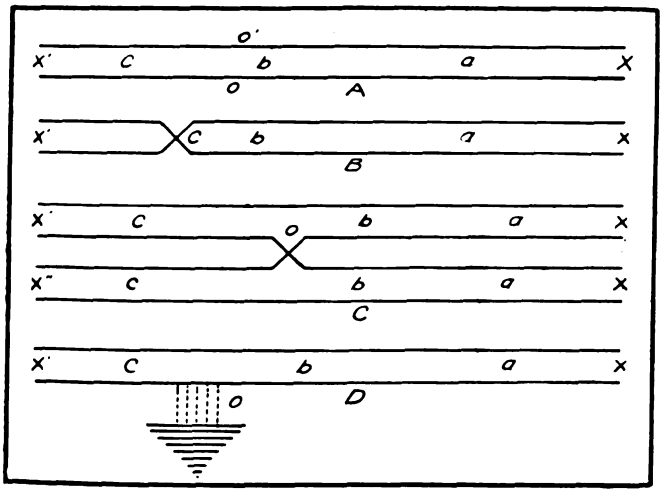

Fig. 3.

change, at each one of the accessible points throughout its length. This point will be illustrated by reference to Fig. 3 *a*. Here a metallic circuit is shown running between the exchange, *x*, and the subscriber station, *x'*. Suppose that the accessible points are at *a*, *b* and *c*, respectively, and that the portion of the line between *x* and *a* is made up of underground cable. That between *a* and *b* is made up of aerial lead cable. That between *b* and *c*, of open wires, and that between *c* and *x'* of drop wire. Suppose, further, that the line is open on both sides at *o* and *o'* between *b* and *c*.

This line being tested from *x* would be found to be open through the inability of the person testing to raise *x'*, and the trouble man upon going out would connect his test box to the line at the point, *a*, which would be in the nature of a cable box. Upon doing so he would find that he could raise the exchange, *x*, but not the subscriber. He would then proceed to the point, *b*, which would be in the nature of another cable box, through which the aerial cable passes to the open wires. He would again put himself into communication with the line, and again find that he could raise *x*, but not *x'*. He would thereupon proceed to the point, *c*, where the drop line is connected to the open wires, and make a similar test. This time, however, the conditions would be reversed, for he would be able to communicate with *x'*, but not with *x*. This result would show that the point of trouble lay somewhere between *c* and *b*. He would then inspect that portion of the line, locate and clear the trouble.

This process of locating trouble is one of trial and error, and it might appear as if the time taken thereby would be excessive. As a matter of fact, an experienced trouble man is able to save himself a great deal of needless testing by his knowledge of the points at which the line is likely to be thrown in trouble. This point will be taken up in detail below.

Short Circuits.—The method of clearing short circuits is similar to that just described, with one very important exception, viz.: When a line is open, as in Fig. 3 *a*, there results two good portions of line over which conversation can be carried on in the usual manner: that between *o*, *o'* and *x*, and that between *o*, *o'* and *x'*. In the case of a short circuit, however, the whole line is put out of service, no matter on which portion the trouble is located. Before communication can be re-established the trouble must be cleared. Fig. 3 *b* illustrates this point. Here assume that the same line running between *x* and *x'* is short circuited at *c*, no matter at what point the trouble man connects for a test the short circuit at *c* will prevent him from raising either *x* or *x'*. His method of testing must consist in cutting out the defective portion of the line during his test, by temporarily opening it at the point of testing. For example, the lineman goes to *a* and, opening the line on both sides, tests towards *x* and raises the operator. He then disconnects himself from that portion of the line, and, connecting himself to the opposite portion, tests towards *x'* and finds the short circuit. He then knows that the trouble lies between *a* and *x'*. He proceeds next to *b*, and, opening the line on both sides, tests both ways again. His ability to raise *x* shows him that he has not yet passed the trouble point. He repeats the test at *c* and discovers that the trouble lies at that point. When the trouble is cleared, he closes the line and, going in with the test set, endeavors to raise both *x* and *x'*, and his ability to do so proves the line to be O. K.

Crosses.—Crosses act like a short circuit by throwing the whole line in trouble. Illustrated in Fig. 3 *c*, where two lines are shown, both coming from the same exchange, *x*, and passing through the cable boxes, *a* and *b*, and taking the drop lines at the same point, *c*. Suppose that the two adjacent conductors are crossed at *o*, obviously the resultant cross talk would be heard upon any portion of either one of these two lines. For even when

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only one conductor of each line is in mutual contact a closed metallic circuit results through the instruments and drops on each line.

The process of testing for crosses resembles, therefore, that employed in locating short circuits, but is more complicated. Proceeding to the cable box, *a*, the trouble man goes in on either one of the two lines—for example, the upper one—and rings. Upon so doing the drop and the telephone bell on the upper line will be operated in the usual manner, while those on the lower line will be operated over the circuit formed at the cross, *o*, unless the resistance of this contact should be very high. Both operators, and probably both subscribers, will answer the call, and the trouble man, listening in, will hear the conversation on both lines. If the upper line be opened at *a* and a test made toward the exchange the cross ringing and cross talk has been removed. If, however, still keeping the line open at *a*, the test be made toward *x'*, the cross ringing and talking will still be found. This test should be repeated on the lower line as a measure of safety, because where a cross exists, other trouble may accompany it, and with a view of locating it, both the affected lines should be tested thoroughly.

The test is repeated at *b* and *c*, with the result that the cross is located between *b* and *c*. It sometimes happens that several lines become crossed together, causing not only "crosses," but also "short circuits." This condition, with the exception of the falling of poles, occurs only in cables, and will be dealt with later.

Grounds.—In locating no other class of trouble is experience of so much value. This class can vary from a dead ground on both sides to an escape on one side, and while the same general plan is followed in locating the fault, a trained ear is essential in the clearing of the trouble. The reason for this is not far to seek. All grounds, excepting the lightest escape, make the line affected more or less noisy, and the character and intensity of the noise determine not only the nature of the ground, but also its location.

Fig. 3 *d* shows a line running between the exchange, *x*, and the subscriber station, *x'*, and grounded on one side at *o*. Under this condition the line is noisy unless the ground amounts only to a slight escape. It is possible, by going in at *a*, *b* or *c*, to raise both *x* and *x'* and even to carry on conversation with these two points, although the presence of the noise may render it very indistinct.

The trouble man would go to the cable box, *a*, and "listen in" on the line. He would note the nature and intensity of the noise, and the information thus obtained would serve to direct his further efforts. He would then open the line at *a* and test toward *x*, and find that portion to be free from trouble. He would close the line through and proceed to *b*, where he would repeat the listening-in process and also the test. The chances are that he would not need to repeat the test at the point *c*, as the information already obtained would, together with his knowledge of the construction of the various portions of the line, be sufficient to enable him to locate the trouble in the portion of the line between *b* and *c* and render it unnecessary to make a third test at *c*. If the line is dead grounded on both sides, the chances are that no noise will result, and the conditions will be those resulting from a short circuit.

Probable Points of Trouble.—Nothing has been said about cut-outs or swing trouble of any nature. Troubles of this kind must be located by the aid of experience, as from their character there is no cut-and-dried method of testing that will serve the purpose. The experience referred to is derived from two sources. First, a trained ear, which means, in addition to increased sensitiveness of the organ, the ability to distinguish the different noises made by the various classes of trouble. Second, from the knowledge of line construction, the ability to pre-determine the probable location of the various classes of trouble.

Each one of these two kinds of experience assists the other. A trouble man, listening on a line, determines by the character of the noise that there is a swinging ground which, when "in" produces "trolley induction," and he reasons in this fashion: "Since the trouble is of a swinging nature it must be on some part of the line that is exposed to the action of the wind or mechanical shock, and so it is located somewhere in the open wires, probably at a pole where a guy is placed. Since the line parallels for a considerable extent of trolley line, the presence of the induction is perfectly natural. If the line was not so situated, the inference would be that the presence of induction was caused by a 'cross' with some line which did parallel a trolley road." Thus it will be seen that his knowledge of line construction forms a guide to his ear in locating the trouble.

A trouble man was once sent on a cut-out, the line affected running for a considerable distance along the elevated railroad structure. After going to the various accessible points and listening in without being able to locate the trouble, he sat down on the platform of a station past which the line ran and began to think it over. He had observed that the cut-out appeared about every five minutes, and lasted for a period of about four seconds. Just then a train approached, stopped at the station, and started on its way again. As soon as the last car had cleared the station, he jumped down on the track, seized with a sudden idea, and listened in on the line. As the train approached the next station the cut-out came in, and lasted until the train stopped. He hastened down to a point near the next station, where the line sprang off from the structure, and, upon examination, found a loose connection, which, when the structure was jarred by the passage of a train, caused a cut-out.

Cut-outs caused by loose joints are particularly hard to locate, especially on long toll lines, for the reason that, since the touble appears only at intervals, the trouble man cannot feel sure that, when getting an O. K. test with either end, the portion of the line in trouble has been cut out, or that the O. K. is merely due to the fact that the cut-out did not come in when the test was made. Referring to Fig. 3 *a*, the trouble man goes to *a* and, opening the line towards *x'*, may, when testing with *x*, get the line O. K. and when testing with *x'* get the same result. Upon proceeding to *b* he might get a cut-out towards *x* and O. K. towards *x'*. Under these conditions he would return again to *a* and repeat the test. But this time he might get a cut-out towards *x* and O. K. towards *x'*. So that it will be evident that the location of such a trouble is by no means an easy task, especially where long journeys have to be made between testing points, and it is only with the exercise of the utmost skill that the work can be accomplished.

THE TELEPHONE AS A MESSENGER.

THE value of the telephone upon the farm has often been illustrated, but two news items have been received which tend to show further its value in securing aid when such is needed. At a farm down in Texas a little boy was accidentally run over by a mowing machine and had one of his legs cut off. Luckily there was a telephone at the farmhouse, and the doctor who lived twelve miles away, was communicated with and was able to get to the farm in time to save the boy's life.

Another case is at hand from the same neighborhood, in which a country store was broken into and $30 stolen. By means of the telephone all the farmers within a radius of fifty miles were told to be on the lookout for any strangers, with the result that two of the men were arrested at a point forty miles away from the scene of the robbery.

IN KANSAS CITY.

CLIFFORD DOWLING, a negro boy, eight years old, was found by the officers of No. 8 station in the East bottoms the other night trying to get into Electric park. At the station the boy told the sergeant that he ran away from the negro orphans' home at Howard and Michigan avenues.

"Have they got a 'phone out there?" asked the sergeant.

The negro thought earnestly for a moment and then told the sergeant that there was a 'phone at the home.

"Which 'phone?" asked the sergeant.

Again the negro boy pondered deeply, then his white teeth were shown in a smile as he remembered an almost forgotten pleasure.

"Hit am a graphophone," he answered.

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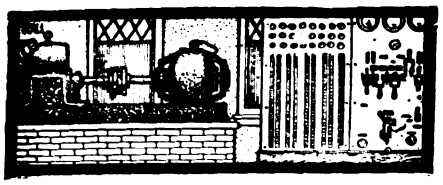
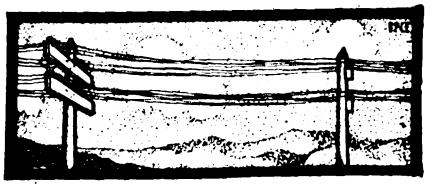


QUERIES

Questions on any subject relating to telephony will be answered on this page.



TRANSPOSITION.—(420.)

Will you please illustrate with diagram how to connect a grounded line with a metallic one? We have two lines that cross-talk very badly—one a private line, the other going to the exchange. For about a mile they run parallel and then branch off from one another. As there are no electric light or trolley systems to bother us, we thought to run metallic circuits to the point where the lines branch off and then use grounded lines.

ST. K. T. CO.

In Fig. 420 is illustrated the method of connecting a grounded line to a metallic one. One-half of the coil is connected to the

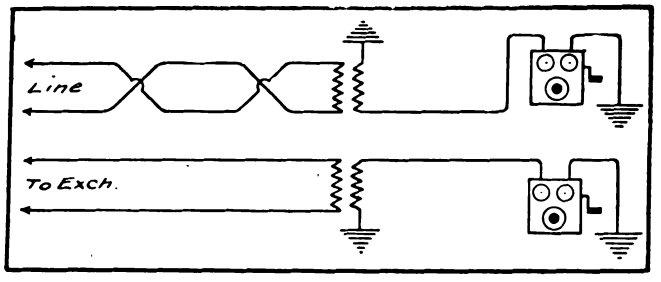


Fig. 420.

metallic circuit, the other half is grounded on one side, the other side being connected to the line. It would be necessary to transpose both of the metallic circuits. In purchasing your coils you should tell the manufacturer what you want them for, because a coil intended for talking through only would not transmit ringing current in a large enough quantity to operate the bells or signals.

BELLS RING FAINTLY.—(421.)

We have a good deal of trouble with our magneto bells on one of the lines; they don't seem to ring at all well. There are fifteen instruments on this line. Can you suggest what the trouble is and supply a remedy.

L. T. C.

We would suggest a very thorough examination of the line, to see that it is not shunted at any point. A shunt may occur in any one instrument or in the inside wiring of any station, or in the switchboard. A good way to find out if this is the trouble would be to open the line at the exchange and test through the switchboard to the protective devices. If you haven't a voltmeter for this purpose, a receiver placed in series with the line will do. If you don't hear any noise in the receiver it will show the line to be clear and open so far. Now go out and open one instrument at a time, and notice whether the bells of the other instruments ring any better. Continue to do this with all the instruments, being sure the lines are opened where they connect with the inside wiring. If you are unable to locate the trouble this way it would appear that the line was too heavily loaded for type of bells and generators used. The resistance of bells for such a line as this should not be less than 1,600 ohms and the generators should be of the fire bar type to give the best results.

INSULATORS.—(422.)

Will you kindly inform me through the medium of your paper what is the better material to use for insulators, porcelain or glass? B. C.

Briefly stated, porcelain has the following advantages: Its insulation resistance is 5 or 6 times that of glass. It is more durable and less likely to be broken. It is less hydroscopic. That is to say, does not as readily condense moisture upon its surface.

Glass possesses the following advantages: It is cheaper than porcelain. Since when exposed to the air both porcelain and glass become coated with moisture the actual insulation resistance of each is equal. Glass, being transparent, no shaded surfaces are present in which spider webs and cocoons can be found. The broken surfaces in glass present the same imperviousness to moisture as do the whole surfaces, while the broken surfaces of porcelain absorb moisture, thereby reducing the insulation resistance. All things considered, glass is the better material to use.

RINGING THROUGH REPEATING COILS.—(423.)

Is it possible to ring through repeating coils without much loss of potential? R. J. S.

A repeating coil to produce the best results in the transmission of speech is designed upon somewhat different proportions than the one which is best adapted for ringing. It is difficult and sometimes impossible to ring through the ordinary repeating coil that is designed only for transmission, but if a coil is properly proportioned, it is possible to talk through it and to ring through it with almost equal facility. In general terms, about ninety per cent. of efficiency can be expected.

SAG IN LINE WIRES.—(424.)

Will you kindly give me a table of allowable sag of line wire, for different length spans and different temperatures? C. W.

Following is the table you request, worked out for spans from 75 feet to 200 feet in length, and for temperatures in Fahrenheit degrees from 30° below zero to 100° above zero:

Temperature in degrees Fahrenheit.	Span 75 ft. sag.	Span 100 ft. sag.	Span 115 ft. sag.	Span 130 ft. sag.	Span 150 ft. sag.	Span 200 ft. sag.
— 30°	1 in.	2 in.	2½ in.	3½ in.	4½ in.	8 in.
— 10°	1½ "	2½ "	3 "	4 "	5 "	9 "
+ 10°	1½ "	3 "	3½ "	4½ "	6 "	10½ "
+ 30°	2 "	3 "	4 "	5½ "	7 "	12 "
+ 60°	2½ "	4½ "	5½ "	7 "	9 "	15½ "
+ 80°	3 "	5½ "	7 "	8½ "	11½ "	19 "
+100°	4½ "	7 "	9 "	11 "	14 "	22½ "

SEASONED RESISTANCE COILS.—(425.)

A prominent manufacturer of Wheatstone Bridges, in advertising his instruments, states "the platinoid coils in their sets are properly seasoned and will not gradually change their resistance." Do metals actually change their resistance with age, and how are platinoid coils seasoned? F. W.

When any metal is drawn into wire, the process of forcing the metal through the die disturbs its molecular condition and produces an effect which is somewhat similar to that of tempering steel. As time elapses, this artificial molecular condition gradually

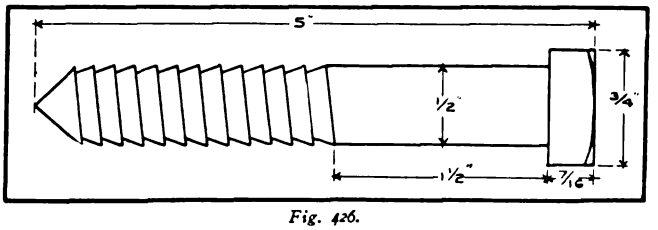


Fig. 426.

changes, and the molecules of the metal tend to resume their original condition. This effect produces a certain change in the resistance of the wire, consequently unless some means are taken to counteract it, coils which are standardized when the wire is freshly made will not retain their original resistance. The process which is used for aging, as it is called, simply consists in heating the wire to a low temperature for a prolonged period of time exactly in the same way as a piece of steel would be annealed.

LAG BOLT.—(426.)

Is there any special style for lag-screws? If so, will you please give them. G. R. N.

The standard size of cross lag bolts or fetter drive screws is shown in Fig. 426, which gives dimensions.

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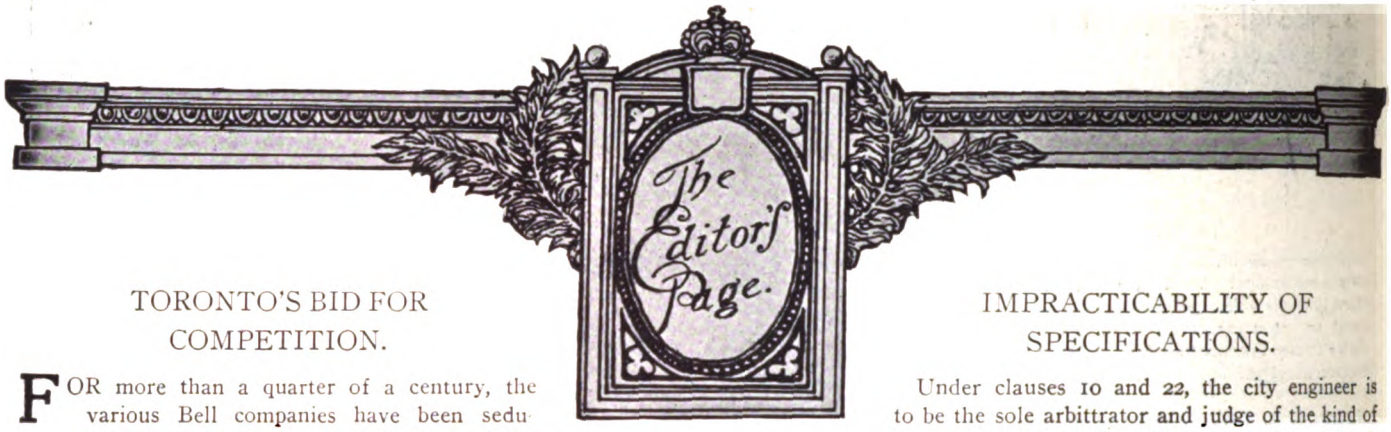

TORONTO'S BID FOR COMPETITION.

FOR more than a quarter of a century, the various Bell companies have been sedulously carrying on a campaign of gratuitous public education—endeavoring to educate the American people in the mutual relations of telephone corporations and their patrons. But concisely and in the vernacular, the ethical code of the Bell is comprised in the single sententious and pungent sentence, *"The public be damned."* Considering the care and thoroughness with which this idea has been inculcated, it is perhaps not surprising that the people have come to believe in a general way that all telephone companies are ruthless and wanton.

Disgusted at the service supplied by the Bell Company and encouraged by the success of municipal telephony in Great Britain and the Independent methods in the United States, it appears that the city of Toronto, one of the most enterprising Canadian towns, desired competition. To this end its mayor has issued a document entitled *"Specifications for the Installation and Operation of a Telephone Business or Service in the City of Toronto."* The object of this pamphlet is to set forth the conditions under which the city of Toronto wishes to invite capitalists to undertake the construction and operation of an Independent telephone plant. In the formulation of the regulations which are herein set forth, it seems as if the Toronto authorities had reacted against the evils which have in the past accompanied telephonic installations in that city, and gone so far as to prescribe measures which are in some cases exceedingly drastic and likely either to repel would-be investors, or to cause them to exact rates for service which will be onerous to the subscriber. The following quotations from the various clauses of the specifications are abstracted, indicating requirements which either should be modified or are likely to be exceedingly repellent to Independent capital:

> Clause 1. Tenders or applications will be received by the Board of Control (hereinafter called "the Board") of the Corporation of the City of Toronto (hereinafter called "the Corporation") for the privilege of installing and operating a telephone business or service in the City of Toronto (hereinafter called "the City") for the period of ten years from the day of , 1904, upon the terms and conditions hereinafter set forth.
>
> Subject to the terms and conditions herein contained, the applicants shall be granted the right to operate a telephone system and also long-distance connections for a period of ten years as aforesaid, within the city limits as they at present exist, or as they may be extended within the said period or periods as hereinafter provided. Such right to operate may be renewed by the Cty for further consecutive periods of five years each, at the option of the City, upon the terms herein contained, so far as applicable, or upon such terms as may be agreed upon.

By this quotation it is seen that investors may be limited to a period of ten years of operation, and, assuming this to be rigorously enforced, and subsequent renewal be denied, such rates must be charged as will enable the capitalist to recoup within this period the investment in the plant, as well as the proper and normal charges for service.

According to clauses 6 and 7, the telephone company must guarantee to get 2,000 subscribers and must further guarantee to keep on getting subscribers at the rate of 500 in every three months. Who can say in advance that it is possible to obtain so many subscribers? It is quite conceivable that a company might be unable to secure as large a subscription list.

IMPRACTICABILITY OF SPECIFICATIONS.

Under clauses 10 and 22, the city engineer is to be the sole arbittrator and judge of the kind of apparatus and quality of service to be rendered. Now, telephony is a business requiring the study of a lifetime, and an adequate decision as to what constitutes proper facilities and reasonable service is as much expert opinion as the diagnosis of a physician or the verdict of a lawyer. If the city engineer is an expert telephonist his opinion might be of value, but his expertness is an open question, and it is certainly as unreasonable to appoint him a final court of appeals in the case of the telephone company, as to expect him to pass upon the conduct of the board of health during an epidemic of small-pox. Another clause further along seems even more unfair. It reads:

> Clause 28. No service other than a telephone service shall be given over a telephone wire to any subscriber for a telephone in the city without the consent of and upon an agreement with the Corporation defining the terms and conditions of such service.

The hardship of this clause lies in the fact that it restricts the company in the use of its apparatus to a degree that may prove very onerous in the future. It is conceded by all students of telephony that the time is coming when an important part of an operating company's revenue may be obtained from what are known in industrial enterprises as "side-products." That is, in telephony, the use of the wires for purposes of fire alarm, burglar alarm, telegraph, or such other attachments as may be worked simultaneously over the same lines. The Bell long-distance company has already begun to harvest part of their by-products through leasing its wires for telegraphing. To deny a new company the right to so employ its property is, to say the least, an arbitrary condition and one that will not invite the best results either to the city, to the subscribers or to the investors. To be sure, in a subsequent clause, an endeavor is made to meet this objection in a way, but any practical man in the business must see that it is absolutely useless, because no operating company, as matters now stand, and in the present stage of development, is in a position to forecast the future sufficiently to avail itself of the opportunity here set forth. The amendatory clause reads as follows:

> Clause 32. Applicants may put in an alternative tender for the supply of light, power, or any other service, by means of the wire, or wires, conduit or conduits to be used in connection with the telephone service embodying in the tender the terms upon which such light, power or other service is to be supplied, but shall not include any of such services unless in connection with a telephone service to a customer.

We heartily commend the evident good faith of Toronto's mayor in endeavoring to carefully safeguard the interests of his town, and we believe that in the long run contracts which are so framed and drawn as to be mutually fair to both parties are in the interest of capital. But it is manifest that one-sided contracts such as is proposed here are detrimental to the best interests of the telephone using public. The proper course requires both parties to meet upon some middle ground which shall be determined by mutual consultation and to frame a contract which is fair and just to both from all standards. We therefore earnestly recommend the mayor of Toronto to get expert telephonic advice from any of the well-known unprejudiced telephone engineers and to revise and remodel the specifications in such a manner as to secure for his town the best service at the lowest profitable rates.

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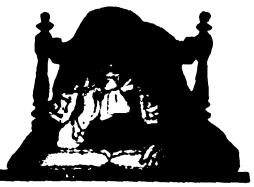
The Telephone in the Courts



Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

HOUSE MOVING AND TELEPHONE CABLES.

We own a franchise for the erection of poles, wires, abutments, and all other necessary appliances for the successful conducting of a telephone exchange, in a village of about one thousand populationn. By right of said franchise, we erected a cable extending from one end of the village to our central office, near the center of the village. The cable is 18 feet from the surface of the street. Parties desire to move a building along the street over which our cable crosses, and the height of the building will necessitate the cutting of our cable, at a cost to exceed $100.

Has the telephone company the right to enjoin the moving of said building as far as it interferes with its cables? Or if not, has the company the right to enjoin the moving of the building until sufficient funds are deposited with it to pay the actual expense of cutting and splicing the cable, or a bond is given to cover said expenses? Please give authorities. M. M. H.

IT has been decided by the courts that a telephone company has the right to enjoin the moving of a building that interferes with its lines. This was in the case of the Northwestern Telephone Exchange Company vs. Anderson, recently decided by the Supreme Court of North Dakota. Anderson was licensed by the city to move houses, and given special permission to move a frame building through the streets. The company secured an injunction to prevent the interference of its wires. The injunction was dissolved upon the giving of a bond by Anderson to indemnify the company against damages. The house was moved and suit brought on the bond by the company to recover about $200.

The court held that the franchise of the company was a vested right that could not be impaired by subsequent action of the city directly or indirectly annuling it for purposes not public. The use of a street for moving houses is an extraordinary use thereof, and may be permitted, but not so as to destroy the use of the street for travel and other public purposes. It could not be done in impairment of vested rights, such as were held by the telephone company. Northwestern Tel. Ex. Co. vs. Anderson. 98 N. W. 706.

INTERSECTING LINES AND GUARD WIRES.

HARRY J. RUBIN sued the Richmond & Petersburg Railway Company for damages for the burning of his stock of goods. He alleged that the fire which consumed his store was caused by the defendant's agents moving the poles of the Long Distance Telephone Company of Virginia, and weakening the company's wires so that one or more of them broke and fell upon the wires of the defendant and carried from them electricity to the plaintiff's store, thereby setting fire to it. The plaintiff further alleged that defendant was negligent in running its wires under the wires of the telephone company so close as to incur risk of contact and without erecting guard wires between its wires and the wires of the telephone company. The railway company in defence alleged that it was under no obligation to erect guard wires, and that the telephone company's wires were broken by the sleet caused by a storm so violent and extraordinary that the history of climatic variations afforded no reasonable warning of it.

The court held that the Electric Railway Company, in exercising reasonable care, should offer a very high and exact measure of foresight, skill, diligence, and inspection; and that where a company negligently fails to maintain such devices between its trolley wires and telephone wires, it becomes responsible for injuries which result from contact between the two kinds of wires, its negligence being the proximate cause of the accident. The question of whether or not the defendant had exercised the proper degree of care, was a question for the jury. The jury having decided it in favor of the plaintiff and given him a judgment, their result would not be overturned. The court made the same ruling in respect to the jury's determination of the question of whether or not the breaking of the telephone wire was caused by an extraordinary storm.

Richmond & P. Elec. R. Co. vs. Rubin, 47 S. E. 834.

CITY OF ELGIN SEEKS TAX.

MUNICIPAL corporations all through the Middle West, where the Chicago Telephone Company operates lines and possesses franchises, are watching with interest the progress of the suit recently commenced by the city of Elgin to tax the corporation the sum of $1 per annum for each telephone in use in the city. The company holds its grant in Elgin by virtue of an ordinance similar to that in effect in nearly every city wherein the corporation does business, and the outcome of the litigation bears considerable import.

The ordinance of 1881, the original measure by which the council granted the company permission to erect poles and operate lines in Elgin shows that there is no limit to the city's authority. A portion of this ordinance, as cited in the bill, is as follows: ". . . that the Chicago Telephone Company is hereby authorized to erect telephone poles in the streets of the city of Elgin and to construct and maintain a line or lines of telephone in connection with same. All proceedings of said telephone company and the privileges acquired under this ordinance shall be subject to any ordinance relating to the same which may hereafter be passed by the city council of the city of Elgin."

This ordinance was accepted by the telephone company in a letter written to officials. The bill further cites the ordinance passed last spring by the city council, wherein the company was taxed $1 per instrument now in use in this city. Attorneys estimate that there were 2,500 telephones in use at time and that the company is liable for the sum of $2,500.

TELEPHONE POLES IN NEW YORK HIGHWAY.

THE Supreme Court of New York has held that when the owner of land adjoining a highway does not own any interest in the highway and his rights as an abutting owner are not interfered with by the erection of telephone poles along the highway, he cannot maintain an action for their removal. The action was begun to compel the removal of certain telephone poles erected by the Bell Telephone Company of Buffalo in front of the plaintiff's lands. The plaintiff had no record title to the land to the center of the highway, but his property extended only to the side of the road. The title to the highway was in the Holland Land Company, which conveyed by deed to the defendant the right to erect its poles along the highway. The plaintiff, although admitting that he had no record title to the highway in front of his premises, insisted that he had acquired title thereto by adverse possession. The plaintiff had occasionally cut down the weeds growing in the highway in front of his premises, and once in seven or eight years had cultivated the land extending from the sides of the road to the abutting track, sowed crops and seeded it, and had taken off the crops from time to time and cut the grass growing there. He had not enclosed it nor interfered with anyone who traveled upon the highway clear up to his fence.

In the Supreme Court the complaint was dismissed, the court finding that the plaintiff had not acquired any adverse title to the property. Although the court said that had he been the owner of the lands to the center of the highway he would have his right of action either for damages caused by the erection of the poles and the cutting of his trees, or, perhaps, would be entitled to an injunction to compel the removal of the poles. This judgment was affirmed by the Court of Appeals.

Halleran vs. Bell Teleph. Co. of Buffalo, 64 App. Div. 41. 71 N. Y. Supp. 685. 69 N. E. 1124.

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IN THE OPERATING FIELD.

INDEPENDENT TELEPHONE ASSOCIATION OF UNITED STATES TO HOLD CONVENTION AT ST LOUIS.

THE convention of the Independent Telephone Association of the United States will be held at St. Louis, September 20, 21 and 22. The headquarters of the association will be at the Inside Inn, the only hotel within the Exposition grounds. Special rates for parties attending the convention at the Inn have been secured. The sessions will be held during the mornings, thus allowing delegates and visitors ample time during the rest of the day to look over the Exposition.

SOUTH EASTERN KANSAS ASSOCIATION MEETING.

THE Southeastern Kansas Telephone Association held a very interesting and important meeting at Galena, August 15th. The principal object of the meeting was to discuss plans to put the Independent Toll Line system in the eight counties in this part of the State and the northeastern part of the Indian Territory in shape to connect with Kinloch Long Distance Telephone Co., at Joplin, Mo., and Pittsburg, Kan. Plans for better and more extended farm telephone service were also discussed.

The territory covered by this association includes Chautauqua, Elk, Wilson, Montgomery, Neosho, Labette, Crawford and Cherokee counties in Kansas and the Indian Territory lying north and east of the Arkansas River, and at the meeting on the above date the companies occupying this territory agreed to parallel their existing circuits with a sufficient number of No. 10 copper metallic circuits to enable them to connect with the Kinloch and give service to St. Louis and the east and Kansas City and the north. They also decided to establish a clearing house for the purpose of making uniform rates and adopting a system for handling the business interchanged among themselves as well as business to points outside this district.

The plans, when completed, will give the Galena-Joplin lead and zinc district, the coal district and the gas and oil district first-class Independent toll service and connect the same with the Kinloch long distance lines at the above-named points.

CONVENTIONS OF DISTRICTS 2 AND 3, OHIO INDEPENDENT TELEPHONE ASSOCIATION.

THE first business meeting of District No. 3 of the Ohio Independent Telephone Association was held at the Builders' Exchange, at Zanesville, Ohio. Sixty-five delegates were present from all over this district. District No. 3 comprises forty-seven Independent companies in the counties of Coshocton, Muskingum, Guernsey, Belmont, Noble, Monroe, Morgan, Washington, Perry, Athens, Meigs and Gallia.

J. B. Rhodes, president of the district organization, presided over the meeting, which was a purely business session and was called for the purpose of thoroughly organizing the association in this district. Several weeks ago President Rhodes sent out invitations to the officers of every telephone company in this district requesting them to be present at this meeting and assist in the work of organization.

President Rhodes during the past few months has secured a large amount of data of great interest to the various companies. In the third district there are forty-seven Independent telephone companies which have 20,000 instruments in active operation at the present time. In Morgan County alone there are 964 Independent telephones.

During the afternoon interesting addresses were made by J. B. Hoge and C. Y. McVey, of the Federal Telephone Company of Cleveland; M. B. Overley, of the United States Long Distance Company; Frank L. Beam, president of the Ohio Association and general manager of the Citizens' Telephone Company of Columbus; A. H. Doudna, Bridgeport; A. W. Kuntz, Caldwell; H. M. Smith, Carrington; A. C. Davis, Parkersburg, W. Va.; P. E. Fraley, Woodsfield; C. Kissner, Coshocton, and a number of other men prominently identfied in the telephone business.

An auxiliary committee was appointed by the president from the various counties, as follows: Coshocton, L. P. Galligher; Muskingum, B. D. Doan; Guernsey, Wm. Hoyle; Belmont, A. H. Doudna; Monroe, F. C. Hutch; Morgan, Geo. M. Scott; Washington, A. C. Davis; Athens, C. L. Jones; Perry, A. B. Allen. Delegates from Meigs, Gallia and Noble counties will be appointed later. H. W. McKee, of Cumberland, was elected permanent secretary.

About sixty representatives of the thirty odd telephone companies operating in District No. 2 held their first meeting at Canton on September 1. General reports from all present showed that the companies included in this district were in a very prosperous condition and in a position to do some aggressive work in the future. Numerous towns in the district not now having exchanges are under consideration, and in some cases construction has been commenced.

The meeting was held at Hotel McKinley and was presided over by W. F. Laubach. A temporary secretary was elected, after which some brief remarks upon the purpose of the organization were made by the vice-president. Other addresses were made by F. L. Beam, president of the state association; J. B. Hoge, Ed. L. Barber, Hon. Cyrus Huling, H. L. Beatty and by managers of various companies. An executive committee was then appointed, after which a general debate took place upon the developments of the territory, extent of systems and also relative to cases of grievances which should be reported to the executive committee.

Reports incidentally brought forth the fact that the number of Independent telephones outranks the Bell by a ratio of 8 to 1 in the district. New companies are being organized and the interest in the work on hand has grown with great rapidity, new impetus having been given by the formation of the association.

W. H. CRUMB & CO. SELL HOT SPRINGS PLANT.

THE plant of the Hot Springs Independent Telephone Company, which was owned by the well-known firm of engineers, W. H. Crumb & Co., of Chicago, was recently sold by them to a syndicate composed of J. S. Brailey, E. L. Barber and Leo M. Flesh and a party of capitalists from Hot Springs and Kansas City. This property was one of the best developed in the Southwest, and is, therefore, a first-class investment. The purchase price was private, but it is understood to fully represent the value of the property. This is said to be the eighth company that has been promoted by the Barber and Brailey syndicate, and is considered to be the best so far handled by that company.

THE MARQUETTE COUNTY TELEPHONE COMPANY'S RAPID GROWTH.

SINCE the Marquette County Telephone Company established its plant at Masillon, Ohio, a few years ago in opposition to the Bell system the number of telephones has increased wonderfully. At the time the Bell people controlled the field service was then much higher than now, which was in a large measure responsible for the limited use the general public made of the telephones. The Marquette County system had an exceptionally rapid growth, and the enterprise netted a profit on the

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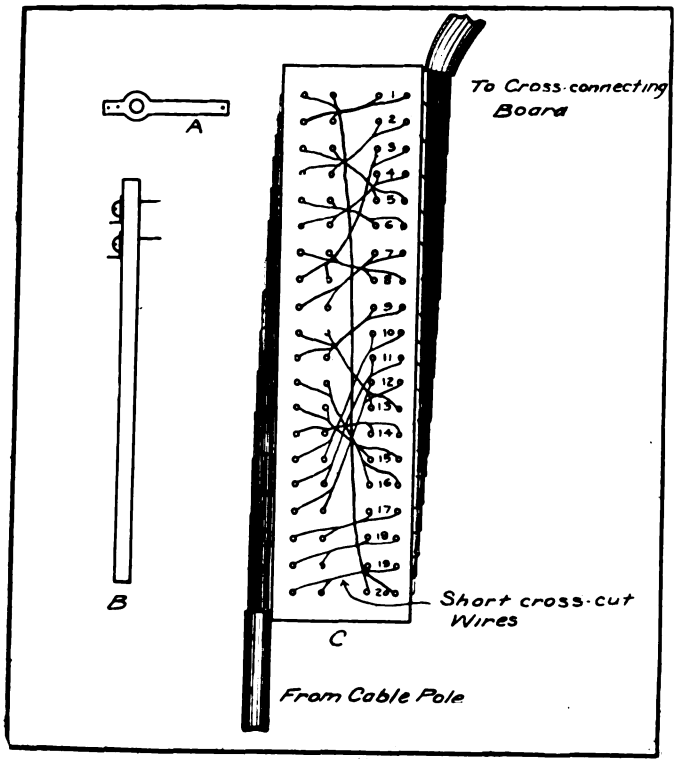
investment the first year. Annual dividends have since been declared.

There are now over 3,000 telephones in use in the county, and the list is increasing steadily.

AN INTERMEDIATE CROSS-CUT BOARD FOR CABLES.

By C. E. Nicholas.

IN cases where no slack cable has been left after the ends have been permanently fixed to allow resetting should the cable be damaged by fire or any other accident, an intermediate cross-cut board for this purpose would save a large amount of time. The idea I have in view is to place a cross-connecting board at some convenient point where all the cables can be distributed and short cables run from there to the main distributing frame. The pairs of the short cable should be tested out and connected to their respective numbers to correspond at both ends. The incoming cable could then be set up as the wires appear without testing. By means of the short cross-cut wires on the board, the



terminals of the cable poles could be made to correspond to the ones at the main frame. The general idea of the board is shown in the accompanying illustration, in which Fig. 1 shows the panel, Fig. 2 a cross-section of the board, and Fig. 3 a view of the terminal clip.

In case of an accident to the cable this panel can be cleared out while the repairs are being made outside, and the wire chief can immediately commence testing for subscribers and as fast as they are found, cross-connect them to their respective cable numbers. All spare conductors can then be connected up. In general, when a cable fault occurs affecting all the pairs, the last splice has to be made before testing can be carried out, thus a great deal of time is lost, besides causing a number of complaints which might be avoided by using some similar scheme to the one described.

SUPERINTENDENTS OF UNITED TELEPHONE COMPANY MEET AT HARRISBURG.

THE superintendents of the United Telephone Company met recently at the company's building and discussed business affairs and mechanical appliances. Later they dined at the Harrisburg Club.

There were present: Frank D. Houck, general superintendent; R. V. Page, Jr., auditor; F. Mulhausen, superintendent at West Chester; W. H. Hartman, superintendent at Lancaster; H. N. Daniel, superintendent at Sunbury; N. E. Nobb, superintendent at Bellefonte; W. P. Beardsley, superintendent at Harrisburg; J. S. Carruth, superintendent at Hagerstown, and W. Scarlett, chief engineer at Harrisburg.

A JOINT TELEPHONE DIRECTORY.

THE Citizens' Telephone and Telegraph Company, of Kenosha, Wis., announces to its subscribers and the public that its forthcoming joint directory will embrace subscribers of the Independent telephone companies of Kenosha, Racine and Bristol, also Pleasant Pairie, Winthrop Harbor, Somers, Union Grove, Paris, Brighton, Salem, New Munster, Fuller, Kansasville, Silver Lake, Spring Grove, Hickory, Millburn, Wadsworth, Lamb's Corners, Lake Villa, Gurnee, Russell, Druce Lake, Antioch, Cornice and the Kreuscher line, alphabetically arranged. A new feature will be a *Classified Business Directory* of all the Kenosha subscribers in each of the 5,000 copies to be furnished to subscribers for service and to toll patrons.

A CALIFORNIAN ILLUSTRATION.

IT often happens that a chance event changes the entire course of a man's life. In this respect it is true that there are many in the telephone business who, if it had not been for some unforeseen event, would be to-day engaged in an entirely different business. As an illustration we cite the following:

In 1901 Mr. James H. Blake, who was living at Christmas Prairie, Cal., had the misfortune to lose a son through a sudden illness. Feeling confident that if he could have secured the services of a doctor in time the boy's life might have been saved, he determined to guard against any future similar occurrence by building a telephone line to Blue Lake, a distance of fourteen miles. With only a few hundred dollars' capital he carried on the work to completion, doing a large amount of the construction work during the winter. This line had four telephones connected to it. A few months later it was extended three miles further on, and later a franchise was obtained from the county and a double metallic circuit was built to Arcata, where Mr. Blake secured a number of contracts. To-day the system has over eighty telephones in use and sixty miles of pole line, together with exchanges at Blue Lake and Arcata.

NEW L. D. LINE FOR HOME COMPANY OF DAYTON.

CONNECTIONS have now been established with Indianapolis and Richmond, Ind., by the Home Telephone Company, of Dayton, Ohio, over their long-distance wires. This new circuit enables the company to offer excellent long-distance service to all points in Indiana.

INDIANA AND OHIO INDEPENDENT COMPANIES JOINED.

THE recent construction of three toll lines between Dayton, O., and Richmond, Ind., has formed the connecting link between the Independent companies of Ohio and Indiana. This was an end much desired, as the various interests of the two States demanded an interconnection between the various Independent companies. Since the same charge is made for five minutes' conversation by Indiana Independent companies as for three minutes by the United States Telephone Company an adjustment of rates will be necessary.

P. AND A.'s NEW LINE TO WHEELING.

THE work on the Pittsburgh and Wheeling Telephone line is being rushed. At present the contractors are at Taylorstown. Here the Keeling & Ridge Company of Pittsburgh have about 100 men employed. The general impression here is that the new line is being built by the Pittsburgh & Allegheny Company of Pittsburgh. All rights of way have been secured between Bridgeville and Washington to Wheeling. The new line will pass through Claysville, West Alexander and many smaller towns. It will cross Chartiers township between Washington and Gretna, and it is understood that it will connect with Canonsburg and reach the Pittsburgh & Allegheny either at Carnegie or Mt. Lebanon.

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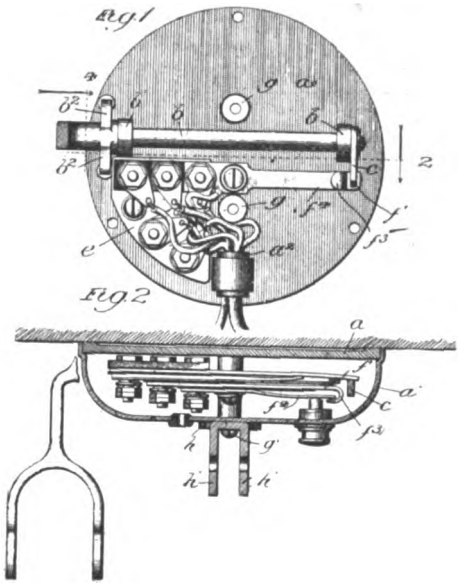
TELEPHONE PATENTS

TELEPHONE SUPPORT.

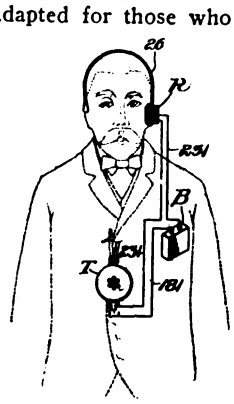
F. R. McBerty, of Evanston, Ill., patents (No. 767,489) and assigns to Western Electric Company a telephone support. This is a device for providing for an improved and compact hook-switch particularly adapted for wall instruments. There is a



base plate, *a*, to which a rocking lever, *b*, is attached. This rocking lever extends outside of the case which covers the apparatus and forms the hook-switch. The rocking lever carries a projection, *c*, which bears against the springs *f4*, which form the contacts to which the terminals of circuit are attached.

TELEPHONE TRANSMITTER.

C. W. Harper, of Malden, Mass., patents (No. 767,753). The object of this invention is to provide an improved telephonic device particularly adapted for those who are slightly deaf. It



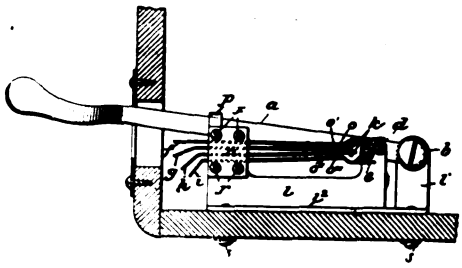
consists of a transmitter battery and receiver combined in a convenient form, as is illustrated in the accompanying diagram, to be worn by the person using. There are no particular novelties in construction.

TELEPHONE LOCKING MECHANISM.

Rudolph W. Goeb, of St. Louis, Mo., assignor to the Controller Company of America, of St. Louis, Mo., a corporation of Missouri, patents (No.766,241). In the specifications for this patent, the inventor states that locking mechanisms have been proposed for the purpose of preventing the use of a telephone until the proper coin has been deposited, and so arranged that the operator has control over the coin in such a manner as to either return it to the party calling or deposit it in a cash box, and the present patent relates to mechanisms of this class. The inventor specifically refers to patents No. 739,114, 739,075, and a previous patent granted to himself on February 13th, 1903, previously noticed in our columns. The present patent being improvements upon the various devices described in the patents mentioned, for a full comprehension of which it is necessary to refer to all of the patents. Those of our readers who are interested in this subject would do well to procure copies of the entire set for reference.

HOOK-SWITCH.

C. T. Mason, of Sumter, S. C., patents (No. 767,584) a telephone hook-switch. The object of this invention is to provide an improved hook-switch which is illustrated herewith. The



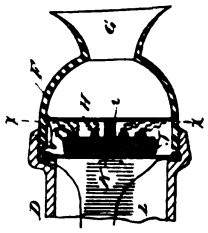
inventor provides a base plate, *l*, to which the hook-switch is pivoted at the point *b*. This plate carries a support, *n*, to which the various springs of the circuit terminals are attached. The hook-switch carries insulating rollers, *e* and *d*, which operate the springs.

APPARATUS FOR KEYS OF BRANCH EXCHANGES.

J. S. Ford, Chicago, Ill., assignor to Western Electric Company, of Chicago, Ill., patents (No. 768,039). This is an invention adapted for private branch exchanges, and essentially consists in connecting various keys together by means of sliding bars so that the movement of one key locks all the other keys which are associated therewith.

TELEPHONE TRANSMITTER.

J. W .Kurtz, San Francisco, Cal., patents (No. 768,185). The object of this invention is to provide a transmitter which is more efficient and which can be arranged to produce clearness and mellowness of tone. A sectional view is shown in the accompanying illustration, from which it will be perceived that the inventor provides two diaphragms, *K* and *H*. To the diaphragm *H* a car-



bon electrode *I* is attached, and between this carbon electrode *K* the granular carbon is placed. Electrical connection between the diaphragm *H* and the carbon electrode *I* is secured by providing a number of flexible conducting wires as shown.

INDIVIDUAL SELECTIVE SYSTEM.

Benjamin Brooks, of Springfield, and Howard F. Metcalf, of Holyoke, Mass., patent (No. 766,806). This invention belongs to the step by step class, but is operated in a curious manner. The inventors provide an electromagnet, the armature of which carries a paul that operates a toothed wheel. Every impulse sent over the line moves the toothed wheel forward one notch. The armature of the magnet carries a prolongation which strikes against a ball and the impulse thereby given rolls the ball up an inclined plane. When the ball returns by gravity, it releases a detent and allows the toothed wheel to return by gravity to its

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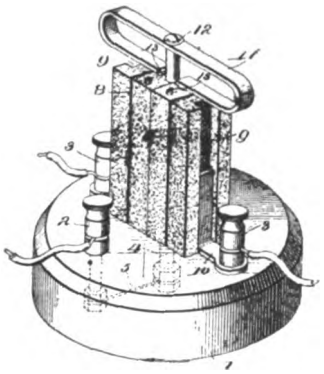
normal position. The toothed wheel carries a contact located at a different position upon the various wheels in the different substations. By moving the wheel with the proper number of impulses, any station may be rung and the ringing continues so long as the ball is rolling upon the inclined plane. When the ball returns it releases the toothed wheel, which returns to its normal position.

LIGHTNING ARRESTERS.

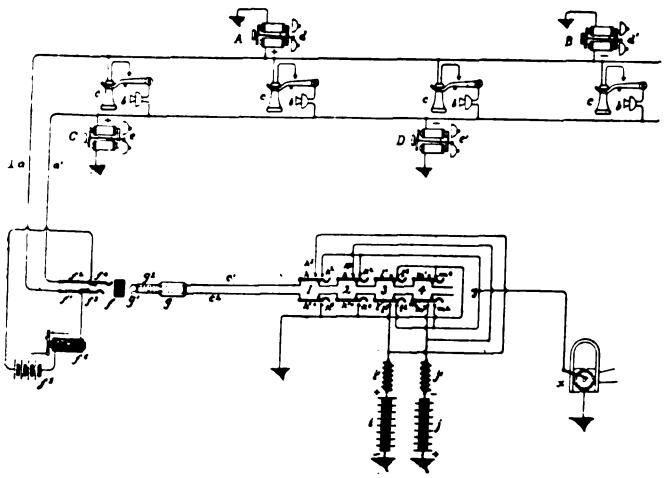
C. A. Rolfe, of Adrian, Mich., patents (No. 768,196) and assigns to the Rolfe Electric Company, of Chicago, Ill., a lightning arrester. The object of this invention is to afford an improved lightning arrester. The inventor provides an insulating base (1) upon which the binding posts (3, 3 and 2) are mounted. The



posts (3, 3) are connected to springs which secure carbon blocks mounted vertically, the carbon blocks being separated by a thin film of insulating material (8). To the center block the post (2) is connected, which goes to ground.

PARTY LINE SYSTEM.

T. C. Drake, of Malta, Ohio, patents (No. 768,272) an improved party line system. This patent relates to an improvement in party line selective signalling along the lines of a somewhat similar patent recently granted to the same inventor, which has been noticed in these columns. The circuit is conventionally shown in the accompanying illustration, from which it will be perceived that the substation apparatus includes the ordinary biased ringer legged to ground from either side of the line. At



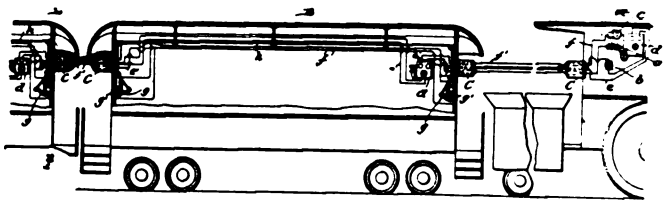
the central office a ringing generator is arranged to supply positive and negative pulsating current, which may be sent over either side of the line. In addition, two batteries are arranged so that positive current or negative current may be transmitted over the line in such a manner that the positive waves of the generator may be reinforced by positive current and negative waves by negative current. By this means the inventor secures a greater margin in ringing.

LOADED ELECTRIC CIRCUIT.

Howard S. Warren, of Everett, and George A. Campbell, of Newton, Mass., assignors to American Telephone & Telegraph Co., a corporation of New York, patent (No. 729,709). It is known that when an electric wave travels over a heterogeneous circuit, it is reflected when it passes from one portion of the circuit to another, particularly when the different portions of the circuit vary markedly in resistance, inductance or capacity. This is particularly the case at the ends of such telephonic circuits as are attached to long lines, and the object of this patent is to prevent these reflection losses; accordingly, the invention consists of localized artificial impedances or capacities which are introduced into the various sections, into which a long line may be divided in such a manner that there is no sudden change between the electrical properties of any section and the succeeding one, or in other words, at the ends of the line, the inductance or capacity is, so to speak, tapered off and so no abrupt change is made. The inventors accomplish this object by introducing the proper reactance of coils at various points in the circuit.

TELEPHONE AND SIGNAL APPARATUS FOR RAILWAY TRAINS.

B. W. Speck, of Uhrichsville, Ohio, patents (No. 768,547) a telephone and signal apparatus for railway trains. This is an invention for providing telephonic connection between the cab of a locomotive and the cars of the train which it draws. The



essential features are shown in the accompanying illustration, from which it will be perceived that a telephone set is located in each car and connected by means of a circuit extended between the cars to a set located in the locomotive. The essential features in the invention are comprised of the method of making flexible connections for the circuits between the cars.

APPARATUS FOR TRANSMITTING MESSAGES BY TELEPHONE

Edgar W. Day, of Baltimore, Md., patents (No. 766,225) apparatus for transmitting messages by telephone. The intention of this invention is to provide a means for telephonically transmitting messages. The inventor provides a phonograph, upon the record of which the syllables which compose various words are recorded. In order to transmit a message, the operator so manipulates the key which controls the motion of the phonograph in such a manner as to combine in any desired way the various syllables to form a word. For instance, supposing the record to contain the syllables com-for-ing-tion. These may be combined to form comfort, comforting, forming, and formation, and in this way words may be spelled out.

MEANS FOR INTENSIFYING TELEPHONOGRAPHIC RECORDS.

E. E. Ries, of New York, N. Y., patents (No. 768,541), a means for intensifying telephonographic records. This invention relates to an improvement in apparatus for making telephonic records of the class known by the name of telegraphones, in which a magnet attached to the diaphragm of the receiver is placed over a moving steel band and imparts magnetism to the band depending upon the vibrations made by the diaphragm. In this particular invention the inventor arranges several bands to be effected by the diaphragm magnets and then arranges the bands so that they may be superimposed one upon the other when the record is to be transmitted, and by this means expects to obtain the combined magnetic effect of the several bands.

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THE WEEK'S MESSAGES

FINANCIAL.

CHICAGO, ILL.—A trust deed for $50,000,000 made by the State Independent Telephone & Telegraph Company, which has offices in Jersey City, N. J., Chicago and Aurora, Ill., to the American Trust and Savings Bank as trustee, has been filed.

GENEVA, IND.—The Geneva Telephone Company has increased its capital stock from $500 to $2,000.

INDIANAPOLIS, IND.—The July statement of the Delaware and Madison Counties' Telephone Company, Indiana, is a gratifying one to the stockholders. It compares as follows with the statement for July, 1903:

	1904.	1903.
Income from rentals	$6,336.76	$4,511.50
Income from tolls	1,258.03	827.39
Income from building	135.00	135.44
Allowances	31.18	21.40
Gross income	7.698.61	5,452.49
Operating charges, taxes and insurance	4,006.87	2,901.08
Net income	3,691.74	2,551.41
Interest	1,666.66	1,519.17
Surplus	2,025.08	1,032.24

Number of telephones in service July 1, 1904, 3,828. The company has in its territory such thriving cities as Anderson, Alexandria, Albany, Elwood and Pendleton.

ALBERT LEA, MINN.—The Albert Lea Telephone Company has decided not to sell its system to the Twin City Telephone Company, and instead to increase its capital stock to $30,000 and remodel its entire system.

EDGERTON, MINN.—The Edgerton Telephone Company, by F. W. Coon, president, and W. A. Shelley, secretary, has filed an amendment increasing its capital stock from $6,000 to $18,000.

WILLMAR, MINN.—The Minnesota Central Telephone Company of Willmar has amended its articles of incorporation extending its limit of indebtedness to $1,000,000. The company is preparing to largely extend its lines.

WINONA, MINN.—The Tri-State Telephone Company has declared its fifth quarterly dividend of one and a half per cent.

CRAIG, MO.—The Craig Telephone Company has increased its capital stock from $1,500 to $10,000.

TROTWOOD, OHIO.—The Trotwood Home Telephone Company has increased its capital stock from $10,000 to $20,000.

MEMPHIS, TENN.—The Mutual Telephone Company, of Yazoo City, reports for the quarter that its receipts have been $7,554.13, while its expenses amounted to $5.457.63. The report further adds: "May 25, 1904, the conflagration in Yazoo City destroyed about three-fourths of our system, including the exchange." The company has rebuilt two-thirds of the system.

FRANCHISES.

LOS ANGELES, CAL.—The Home Telephone Company has been granted a franchise along the Ocean Park Speedway and is to commence work at once.

ALTON, ILL.—The Fosterburg & Bethaldo Farmers' Telephone Company, which asked for a franchise to construct a system in Alton recently, has agreed to give the city two per cent. of its gross revenue and made other concessions.

KANSAS CITY, MO.—The Home Telephone Company of this city has again made application for a franchise in Argentine, a suburb of this city. It offers a free telephone as soon as the franchise is given and another as soon as 100 telephones have been installed.

AUGUSTA, ME.—The selectmen have granted the Somerset Farmers' Co-operative Telephone Company the right to construct lines along certain roads in this vicinity, and to enter town by four routes.

BREWSTER, MINN.—The Minnesota Valley Telephone and Telegraph Company has been granted a franchise by the city council.

CANASTOTA, N. Y.—The Board of Trustees has granted a franchise to the Canastota Telephone Company to operate and maintain lines in Canastota. The company will be incorporated with a probable capital stock of $25,000.

ONEIDA, N. Y.—The Board of Public Works has granted a franchise to the Rome Home Telephone Company for a toll line through the city from the east.

JENNINGS, OKLA.—M. T. Sherman, of Joplin, Mo., has received a franchise to establish a telephone system here.

WALKERVILLE, ONT.—The Ontario Independent Telephone Company has applied to the council for a franchise. The company is seeking a service in Windsor, Walkerville and Sandwich, giving connection with the co-operative company in Detroit. The Bell Company's franchise in Walkerville expires in November, and in Windsor in two years' time.

FREDERICKSBURG, VA.—The Toluca & Fredericksburg Telephone Company has secured a charter awarded the contract for furnishing and setting the poles of the telephone line, which is to extend from Toluca, in Stafford County, by Garrisonville, Stafford Courthouse, Brooke, and Boscobel, to this city.

ELECTIONS.

MONTICELLO, N. Y.—The Monticello Telephone Company has elected the following officers: C. L. McLoughlin, president; G. L. Hatch, secretary, and H. F. Holmes, treasurer. Edwin H. Strong, A. A. Crane, J. C. Taylor and Stephen Trowbridge, directors.

CALDWELL, OHIO.—The Caldwell Independent Telephone Company was reorganized with the following officers: W. H. Brown, president and general manager; A. C. Brown, vice-president; Arthur Schafer, secretary and treasurer. The capital stock will be increased from $5,000 to $50,000.

WAPAKONETA, OHIO.—At the meeting of the Independent telephone companies of this district, embracing the counties of Marion, Wyandot, Hancock, Putnam, Paulding, Van Wert, Mercer, Allen, Auglaize and Hardin, the following officers were elected: Mr. Matheny, president; D. A. Clark, of St. Marys, secretary.

BRODHEAD, WIS.—At the annual meeting of the Brodhead Telephone Company the following directors were elected: A. S. Moore and A. Broughton. The company has expended nearly $4,000 in construction work within the past year.

COMBINATIONS.

FRANCISCO, IND.—At a meeting of the directors of the Independent Telephone Company and the Farmers' Telephone Company, held here recently, arrangements were made for the consolidation of the two systems. Both of the companies now have systems here and it is now proposed to build a new building and install a new switchboard and to combine the two plants.

McLOUTH, KAS.—H. D. Edmonds has sold out his telephone exchange in this city to Sellers & Son.

BEATRICE, NEB.—The Virginia Telephone Company has purchased the Suler-Stoll line, which connects the towns of Holmesville, Beatrice and Filley.

ST. JOHN'S, N. B.—The Union Telephone Company and the Central Telephone Company, operating in New Brunswick, intend to amalgamate. The Union Company has its headquarters at Florenceville, and uses the Stranger automatic central. The Central Company operates from Belliste.

SHARON, PA.—W. H. Wilson, of Erie, general manager of the Union Telephone Company, is here arranging for the purchase of the Mercer and Lawrence County telephone lines.

PERSONAL.

SYLVESTER CECIL has been appointed manager of the Bourbon Home Telephone Company, at Paris, Ky., in place of C. Humbert, resigned.

MR. J. A. GORDON, of the International Telephone Manufacturing Company, of Chicago, has recently taken charge of the construction of the public service telephone system for the town of Neepawa, Manitoba, where the town is practically doubling its capacity by installing a large amount of additional cable and enlarged central office equipment.

G. L. STERNS has been appointed manager of the Enterprise Telephone Company at Edgerton, Minn.

J. VAN WORMER has resigned the position of manager of the Cleburne Telephone Company.

NEW COMPANY NOTES.

TORONTO, CANADA.—The Independent Telephone Company has applied for a franchise in Windsor, Walkerville and Sandwich, with a capital stock of $100,000. The incorporators are: C. W. Taylor, R. Brooks, J. A. McRae, P. T. Chestey and A. D. Prosser, all of Detroit, Mich.

MAROA, ILL.—The Maroa Telephone Company has been incorporated with a capital stock of $10,000, divided into shares of $40 each, and the following officers: J. P. Stoutenborough, president; J. S. Stoutenborough, secretary, and Hiram Grady, treasurer. The following directors: J. P. Stoutenborough, J. S. Stoutenborough, Hiram Grady, John Smelz, Elliott James and George H. Gilbert.

ST. JOSEPH, ILL.—The St. Joseph Telephone Company has been incorporated with a capital of $18,000, by the following officers: N. C. Hoyt, U. G. Glasscock and O. C. Boggs.

MANNING, IOWA.—The Manning Telephone Company has been incorporated with a capital stock of $21,000.

REINBECK, IOWA.—The Black Hawk & Grant Telephone Company has been organized here with the following officers: Fred Schieber, president; Clarence Sherratt, secretary, and Carl Tank, treasurer.

ARCADIA, KAS.—The Arcadia & Drywood Telephone Company has been incorporated in this city with a capital of $750, and will run a rural line into the Drywood district.

ST. JOHNS, KAS.—The Happy Valley Mutual Telephone Company has been incorporated to construct a system here.

WOODSTON, KAS.—The Woodston Mutual Telephone Company has been organized for the purpose of building lines in Stockton. Arrangements are being made to co-operate with the Stockton and Webster exchanges and rural lines.

HILLSBORO, KY.—The Hillsboro & Flemingsburg Telephone Company has been incorporated with a capital stock of $260.

SCOTTSVILLE, KY.—The Scottsville & Bethlehem Telephone Company has been incorporated with a capital stock of $100, by S. J. Reed, W. E. Stephens and J. W. Hood.

BANGOR, ME.—The Aroostook Farmers' Telephone and Telegraph Company has filed articles of incorporated, with a capital stock of $100,000.

BANGOR, ME.—The North Penobscot Telephone Company has been incorporated with a capital stock of $5,000; $1,260 paid in. President, H. P.Osgood, Kingman; treasurer, W. A. Blanchard; clerk, C. E. Tolman, and G. R. Bishop, all of Carroll, with W. H. Martin, Kingman, and J. W. Lindsay, Carroll.

MONROE CITY, MO.—The Farmers' and Merchants' Telephone Company has been incorporated with a capital stock of $3,000, and will connect this city with the surrounding country with rural lines.

FRANKLIN, N. C.—The Franklin Telephone and Electric Company, authorized capital $15,000, has been chartered here by J. S. Trotter and Sam L. Kelly, of Franklin, and J. H. Weaver and W. M. Farr, of Asheville. The company is incorporated for the purpose of establishing a telephone exchange and an electric light and power plant in Franklin.

JEFFERSON, N. H.—The Jefferson Telephone Company has been incorporated with a capital stock of $1,000.

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KITCHAWAN, N. Y.—The Kitchawan Telephone Company has been incorporated with a capital of $1,000, by E. G. Van Pein, H. B. Forman and J. B. Erhardt, Kitchawan, N. Y.

MARILLA, N. Y.—The Marilla Telephone Company has been incorporated with a capital stock of $3,000, by the following directors: Howard Adams, J. G. Bartoo and William Bates, of Marilla.

NORTH CREEK, N. Y.—The North Creek Telephone Company has been incorporated with a capital stock of $10,000, by Celia A. Pereau, W. T. Campbell, James L. Fuller.

POINT PENINSULA, N. Y.—The Union Telephone Company, of Point Peninsula, has been incorporated with a capital stock of $1,000. The company is to maintain toll stations at Point Peninsula and Three Mile Bay village. The directors are: F. M. Wiggins, A. R. Washburn, M. R. Holbrook, M. A. Barnes, E. P. Rector, A. J. Salsbury and Lansing Barnes, of Point Peninsula, and F. B. Hayes and R. S. Clark, of Three Mile Bay.

ROCHESTER, N. Y.—The Rolfe Electric Company, of Rochester, has been incorporated with a capital stock of $150,000, by F. W. Zoller, J. G. Ealber and C. A. Rolfe.

STAMFORD, N. Y.—The Delaware & Schoharie Telephone Company, of Stamford, has been incorporated with a capital of $2,000, by H. P. Hubbell, E. W. Landon, M. S. Wood, Stamford, N. Y.

TROY, N. Y.—The Troy Auxiliary Fire-Alarm Company has filed articles of incorporation with the Secretary of State, with a capital stock of $40,000. The company purposes to construct and maintain fire-alarm systems. The directors are: J. H. Caldwell, T. S. Watkins and A. E. Bonesteel, of Troy, and L. Emdin and S. L. Conklin, of New York city.

WEYBURN, N. W. T.—The Weyburn Telephone Company has been incorporated.

HALLSVILLE, OHIO.—The Colerain Telephone Company, of Hallsville, has been incorporated with a capital stock of $1,000, by R. D. Robinson, A. L. Maag, S. H. Clark, T. P. Sylvan and E. A. Reed.

DRYDEN, OKLA.—The Dryden Telephone Company has been chartered to do business here. The incorporators are: J. S. Campbell, L. D. Perry, J. S. Wilkins, J. D. Le Mar and I. F. Shrewer.

FOSS, OKLA.—The Northwestern Telephone Exchange has been chartered with $5,000 capital stock. The incorporators are: S. H. James, Emma, Etta and O. H. James.

FREDERICK, OKLA.—The Southwestern Telephone Company has been chartered to do business here. Capital, $5,000.

BOYERTOWN, PA.—A new telephone company was organized here. The company will build to all points in this vicinity, and also a line to Pottstown and Birdsboro.

ABERDEEN, S. D.—The Dakota Central Telephone Company has been incorporated with a capital stock of $5,000,000. The directors are: J. L. W. Zitlow, J. W. Zitlow, W. C. Bicklehaupt, Isaac Lincoln and C. N. Herried.

JUNCTION CITY, TEX.—The Junction City Telephone Company, capital $5,000, has been chartered here to construct and operate telephone lines in Kimble, Kerr, Edwards, Menard and Sutton counties. The incorporators are: T. B. Phillips, M. B. Blackburn and T. J. Bailey.

NACAGDOCHES, TEX.—The Nacogdoches & Southeastern Telephone and Telegraph Company has been organized here. It will operate lines over the Nacogdoches & Southeastern Railway.

RELIEF, VA.—The Frederick & Shenandoah Telephone Company, of Relief, Frederick County, has been incorporated with a capital stock of from $500 to $1,000. The officers of the company are Isaiah Funkhouser, president; I. A. Graves, vice-president; E. R. McDonald, secretary, and H. A. Richards, treasurer.

BEE, W. VA.—The Arbuckle, of Buffalo and Wingfield, Telephone Company, Limited, principal office at Bee, has been chartered for the purpose of constructing and operating a telephone line. Capital stock, $5,000. The incorporators are: Allen Clark, Bee, W. Va.; Oscar Douglas, Buffalo, W. Va.; John Boothe, Extra, W. Va.; Granville, Jeredan, Bee, W. Va.; Charles Harris, Buffalo, W. Va., and others.

UNION GROVE, WIS.—The Union Grove & Paris Telephone Company has been incorporated with a capital stock of $2,000, by Henry Barns, O. P. Graham and E. E. Bartholf.

MISCELLANEOUS.

SAN DIEGO, CAL.—The Home Telephone Company has received 13,000 feet of aerial cable for its line plant.

PEORIA, ILL.—Plans for a new fireproof building for the exchange of the Interstate Independent Telephone Company have been drawn up and it is expected work will commence in a short while.

BLUFFTON, IND.—During a recent severe electrical storm every farm telephone in the county was burned out and a large number of city telephones were made inoperative.

INDIANAPOLIS, IND.—The telephone took the place of the service of orderlies at the recent camp of instruction of the Indiana National Guard at Fort Benjamin Harrison, near Indianapolis. The system was put in by the signal corps to connect the brigadier-general with the colonels, quartermaster-general and the commissary.

CLARINDA, IOWA.—The Independent Mutual Telephone Company has completed a line between here and Shenandoah.

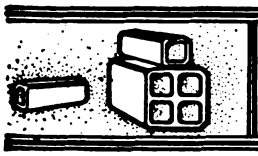
SIOUX CITY, IOWA.—The Payette Construction Company has been awarded the contract for the exchange building of the Independent company. Their bid was $19,419. The contract requires the building to be completed by December 15.

SPRINGFIELD, TENN.—Local capitalists are endeavoring to get the Home Telephone Company, of Hopkinsville, to put an exchange in this town.

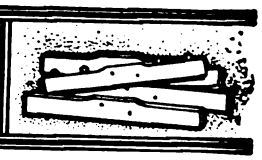
GAINESVILLE, TEX.—The latest issue of the People's Home Telephone Company, which operates systems at Denton, Valley View and this city shows a marked increase in subscribers over the last issue.

UNDERGROUND.

COVINGTON, KY.—The Citizens Telephone Company has obtained permission to build conduit and lay its wires in the business section underground. Work will be commenced at once.



New Construction in the Field



FAIRHOPE, ALA.—The Fairhope telephone system is now in course of construction.

WETHERSFIELD, CONN.—A telephone company is planning new arrangements for the system through this place, making Wethersfield the center of a new circuit connecting Rocky Hill, Griswoldville and Newington.

DE LAND, FLA.—The De Land Telephone Company will extend its lines to Beresford.

DIXON, ILL.—The Lee County Telephone Company will spend about $75,000 in this city in rebuilding its system. The new plans will include a new subway system.

MT. CARROLL, ILL.—The Ronk-Spiker Telephone Company has ordered a new 200-drop switchboard and will install it in the larger office it has secured.

FAIRFIELD, ME.—The Farmer's Co-operative Telephone Company is extending its lines into this town.

CHARLTON, MASS.—Work will be commenced at once on the construction of the farmers' telephone lines in Charlton.

FALL RIVER, MASS.—Committees have been appointed by the Fall River and New Bedford Automatic Telephone companies to formulate a consolidation plan and make preparations to extend the system in Taunton and Brockton.

OVID, MICH.—The Union Independent Telephone Company have completed work in Ovid and vicinity for the present. They have installed twenty-five new rural telephones and added twenty new drops to the board in their exchange. A 100-pair cable has been brought into the office, giving it the present capacity of 275 subscribers. Among the general office improvements is a new cross-connection rack. The force is now at work establishing an exchange at Pewamo.

TRAVERSE CITY, MICH.—The Citizens' Telephone Company are making extensive enlargements to their switchboard, line plant and underground conduit system.

BELVIEW, MINN.—The Redwood County Rural Telephone Company will put in a local exchange.

LAKE ELMO, MINN.—The building of a rural telephone system is under contemplation.

STAPLES, MINN.—The Hewitt-Wrightstown Telephone line will be extended from this place to Verndale.

WELCOME, MINN.—The Armstrong Telephone Company is establishing a local exchange here with fifty-four telephones.

KIMBALL, NEB.—B. A. Lathrop, of Sidney, manager of the Independent Telephone Company, is preparing for the installation of a new system in this city.

STRATTON, NEB.—Workmen are busy putting in a new telephone exchange at this point.

WOODSTOWN, N. J.—The Philadelphia *Inquirer* states that prospects are bright for an opposition telephone company at Woodston, in connection with a rural line to give service to farmers.

WOODSTOCK, N. B.—The Union Telephone Company has extended its system from here to Hawkshaw and Canterbury. The line is a metallic circuit.

CLIFTON SPRINGS, N. Y.—The Clifton Springs & Phelps Telephone Company is putting in a new cable and making other improvements to its system.

WELDON, N. C.—F. C. Toepleman, general manager of the Home Telephone Company, is making preparations to install a new switchboard in Weldon, rebuilding all the lines, using cables, and generally reconstructing its system.

HOBART, OKLA.—The Chickasha-Altus Telephone Company will extend its lines to this city through Mangum and other points.

FORT FRANCES, ONT.—The International Telephone Company, composed of local men, has been formed and is at work putting in an Independent telephone service for the town.

ALBANY, ORE.—The Independent Telephone Company will construct an exchange in Albany.

INDEPENDENCE, ORE.—The city council has granted the Independent telephone lines in this vicinity the privilege to construct lines through the streets of the city.

LEWISBURG, PA.—The United Telephone and Telegraph Company is improving its system at Lewisburg and other places in the county by installing new switchboards and line equipment.

POTTSTOWN, PA.—Dr. Thomas J. B. Rhoads has been elected president of a new telephone company organized here to construct a line from Pottstown to Birdsboro. It will connect at Reading with the Consolidated Telephone Company.

COLUMBIA, TENN.—The Citizens' Telephone Company has let a contract for a new line to run from Bear Creek to Lasca. The line will be run later to Harrison's Mill and Rally Hill.

GRANDBURY, TEX.—Juliff & Cogsdell have purchased the entire exchange of the Grandbury Telephone Company.

VICTORIA, TEX.—A telephone line will be constructed between Victoria and Mission Valley. The secretary of the Business Men's League can give information.

AGITATION FOR INDEPENDENT SYSTEM IN MILWAUKEE.

INDEPENDENT telephone men are again agitating the question of a Milwaukee connection, and it is said that the managers of the Independent telephone companies of the State will hold a meeting in La Crosse or Madison in the near future to discuss the question.

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TRADE NOTES

J. FRANK BUTTERFIELD, of Chicago, has secured the contract for all construction work and extensions to the plant of the Rushville Co-operatice Company, Rushville, Ind.

THE S. H. COUCH COMPANY, of Boston, Mass., reports large sales of its toll line switchboard. Descriptive matter of this or any other apparatus will be sent to interested parties upon application.

J. W. MIDDLETON & COMPANY, 167 Dearborn street, Chicago, Ill., are distributing a very neat embossed desk calendar and samples of their work on stock certificates and bonds. This company will be pleased to furnish estimates at any time for as many certificates or bonds as may be wanted. Being specialists they are in a position to handle all business of this nature in a most satisfactory manner.

THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Block, Chicago, is showing at its exhibit in section 19 of the Electricity Building at the World's Fair, a coin device for the Automatic telephone. This, being the first practical device for this service, is attracting considerable attention. The device is shown attached to an automatic telephone connected with the system working in the Palace of Electricity.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, it is reported, that for this time of the year is having an exceptionally good demand for its small village exchange and rural country party line apparatus, having recently secured outside of its regular trade, contracts for equipment for Holdredge, Neb.; South McAllester, I. T.; Fayetteville, Winamac and Grass Creek, Ind.; Pierre, S. D.; Svea, Minn.; Malvern and Tabor, Ia.; Baldwin, Kans.; Devine, Tex., and Hartland, N. B.

THE FAHNESTOCK TRANSMITTER COMPANY, 132 Havemeyer street, Brooklyn, N. Y., is sending out a novelty in the line of private mailing cards. On the back of the card is pictured a dry cell and to the carbon electrode is fastened a sample of the spring binding post this company manufactures. This binding post possesses many features of interest, such as security without the use of a screw, ability to grip any size wire, rapid in operation and simple. To all parties interested this card will be mailed on request.

THE F. BISSELL COMPANY, of Toledo, Ohio, is issuing several new folders which deal with apparatus and supplies it handles. Amongst others are circulars describing "Security" pole distributing boxes and "Security" trolleys for stringing cables; Mathias Klein & Sons' tools, of which it carries a full line in stock, also price list of "Baird" pay stations, peg counters, instruction card holders, time stamps for toll tickets, toll tickets, and time stamps for business uses. Any or all of these circulars will be mailed upon request.

FRANK B. COOE, of 238 W. Lake street, Chicago, reports the following large exchanges which have used his No. 44 Protector: The Citizens' Telephone Company, of Grand Rapids, Mich., equipped for 5,425 pairs; Home Telephone Company, of Dayton, O., equipped for 6,000 pairs; Northeastern Telephone Company, of Portland, Me., 2,500 pairs; the Home Telephone Company, of Kansas City, Mo., 2,060 pairs in exchange A, 1,440 pairs in exchange B, and 1,640 pairs in exchange C; Utah Independent Telephone Company, of Salt Lake City, 4,100 pairs.

STERLING ELECTRIC COMPANY. Lafayette, Ind., reports an unusual activity in its standard protective devices, having recently installed equipment for the following places: New York city; Savannah, Ga.; Findlay, Ohio; Jackson, Ohio; Crosswell, Ohio; Newall, Ohio; Aurelia, Ohio; Papillion, Neb.; Hazelton, Pa.; Reading, Pa.; Norwalk, Ohio; San Marcos, Tex.; Springville, N. Y.; Winchester, Ind.; Tampa, Fla.; Boston, Mass.; Sidney, Ohio; Union, Mo.; Westfield, Pa.; Sherman, Pa.; Rochester, Ind.; Defiance, Ohio; St. Johnsbury, Vt.; Comer, Ga.; Oxford, Ohio; Clarion, Iowa; Deposit, N. Y.; Wells, Minn.; Zion City, Ill.; Lincoln, Neb.; Portland, Me.; Cleburne, Tex.; Topeka, Kas.; Swedesboro, N. Y.; Greencastle, Ind.; Fulton, Mo.; Herkimer, N. Y.; Hudson, N. Y.; Clinton, Iowa.; Blairsville, Pa.; Angola, Ind., and Suffolk, Va.

THE LEEDS & NORTHRUP CO., 259 N. Broad street, Philadelphia, has issued a very interesting catalogue describing the electrical measuring instruments on view at the exhibit of the National Bureau of Standards at the St. Louis Exposition. These instruments were specially loaned to the Bureau to assist in calibrating and standardizing instruments for the Jury of Awards. Among the various pieces of apparatus illustrated are Wheatstone Bridges of the most improved pattern, standard resistance coils, the Carey-Foster Bridge, the Kohlrausch Slide Wire Bridge, Potentometers, D'Arsonval Galvanometers, High-Grade Keys, Standard Condensers, Standards of Self-Induction and the Rosa Curve Tracer, together with prices and thorough descriptions of the instruments. The company also has for distribution to parties interested a catalogue of ninety-two pages, which describes very thoroughly all its instruments for electrical testing, and nine pamphlets, viz.: No. 1, Resistance Boxes; No. 2, Potentiometers; No. 3, Moving Coil Galvanometers; No. 4, Standard Resistances; No. 5, Portable Testing Sets; No. 7, High-Grade Keys; No. 8, Self-Induction Apparatus; No. 9, Carey-Foster Bridge; No. 10, Hooper Conductivity Bridge.

THE BAIRD MANUFACTURING COMPANY, of Chicago, last week received the following letters:

Gentlemen:—Enclosed find check as payment in full for three pay-stations received. Please send us at once by express one more just like these three. They work O. K. ROYAL TELEPHONE CO., Milford, Ind.

Gentlemen:—Please send by express three new model pay-stations for Canadian coins. Those we obtained from you a short time ago are working admirably. THE MIRIMICHI TELEPHONE CO., Chatham, N. B., Canada.

Gentlemen:—We enclose check to pay for the No. 13 pay station. It is a good one. NEW PINEVILLE TELEPHONE CO., Pineville, Ky.

THE DOUBLEDAY-HILL ELECTRIC COMPANY, Pittsburg, Pa., is sending out a reply postal card which is intended to interest the buyer of telephone material. On the sending half it sets forth the advantages this firm has in the way of extent and variety of stock, and also states the fact that price is the only incidental when the quality of the goods is considered. On the reply half is printed a form for buying, which includes space for shipping directions and also an inquiry space for price on any article desired. The Doubleday-Hill Company would be pleased to hear from all persons interested.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

TO SELL—30 "Baby" Rolfe Protectors; cost $1 each; sell for 25c. Also 2 to 300 jars for carbon cylinder battery at half price of new ones. ROCK HILL TELEPHONE CO., Rock Hill, S. C. 236

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

YOUR TOLL TICKETS!
HERE'S WHERE YOU GET THEM RIGHT!
12—GOOD FORMS TO CHOOSE FROM—12

FOR A DOLLAR BILL we will send you as a trial order, 1,500 of our No. 9 Tickets by return mail. All Tickets padded and transportation prepaid. 5M Large Size, $2.50. 5M Small Size, $2.25. Lots of 5M, 10M, 25M, or 50M. Write for our new catalogue, which gives samples and particulars. We also make Monthly Toll Bills, Trouble Tickets, and Artistic Office Stationery. Endorsed by AMERICAN TELEPHONE JOURNAL.
GILDART BROS., Albion, Mich. 168

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

WANTED—Position by telephone engineer, capable of taking charge of plant and giving good service to subscribers and dividends to stockholders. Address, F. C. Woods, 665 Wells street, Chicago, Ill. 231

I WANT TO LEASE a telephone plant in a live, prosperous city; one that is not earning up to expectations. Can make it pay good interest to owners. I have references and money to back me. Address, Box 219, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 219

POSITION WANTED—As manager or superintendent of an exchange or system. Up-to-date knowledge of the business and methods of operating. Energetic and not afraid of work. Able to secure and hold subscribers, also to take hold of a system and build it up to the highest point of efficiency. References. Address Box 214, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 214

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

EXPERIENCED telephone man, capable to take charge of advertising or sales department, thorough knowledge of mail order methods and office systems, familiar with engraving and printing, wishes position with manufacturing or supply house in telephone or electric lines. Address Box 205, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 205

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YOUR FIRST POLE ORDER

with us is the one that takes the time and trouble to get. In fact, it's the only reason we advertise.

Our exceptional organization for handling Poles from the stump to your stations, guarantees that we get your succeeding orders.

May we not hear from you regarding that "first order"?

MALTBY CEDAR COMPANY, 512 Phoenix Block, Bay City, Mich.

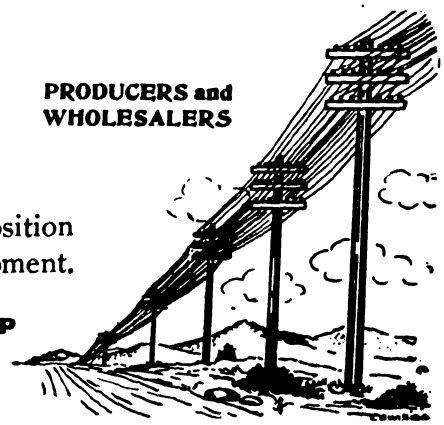
Pittsburgh Agents, TIPPER & PATTON, 512 Bessemer Building.

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



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Thoroughly Seasoned,
Any Length or Size,
Immediate Shipment,
Seven Distributing Yards,
Forty Years Experience.

Main Office:
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Wm. Mueller Company

WHITE CEDAR POLES

We still have a few cars of 6-inch 25-foot poles at special prices. Write us.

Page & Hill Co., *1003 LUMBER EXCHANGE, MINNEAPOLIS, MINN.*

BUY YOUR POLES

When you want satisfaction without worry and trouble

OF

The Fowler Companies

Fowler-Jacobs Co. **Elmore-Fowler-Jacobs Co.** **John H. Fowler & Co.**

FISHER BUILDING, CHICAGO, ILL.

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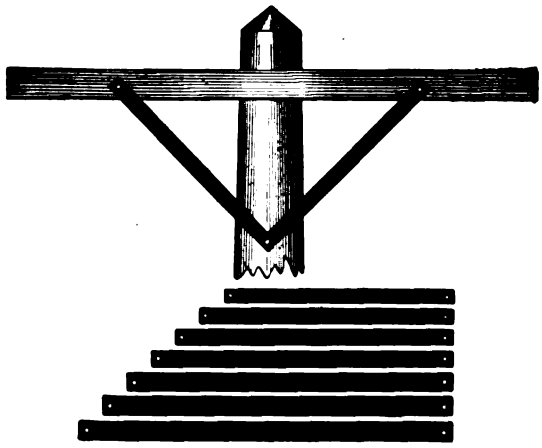

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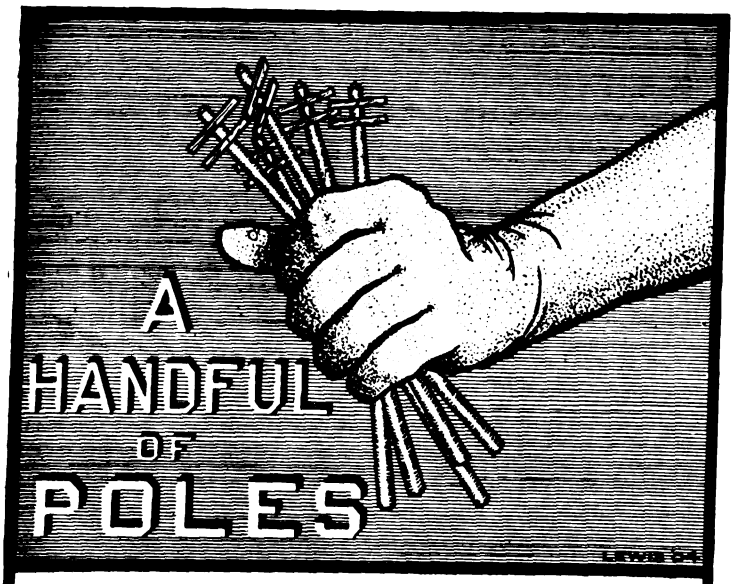
THE STEEL MADE AND ALL THE WORK DONE AT OUR OWN PLANT.

All Sizes Quick Shipment

Plain and Galvanized

INLAND STEEL COMPANY

FIRST NAT'L BANK BLDG. CHICAGO



That's about what most dealers keep in stock. We have them by the carload—vast quantities at your service. So we can ship promptly and quote low prices. The Best Poles, too.

SAND POINT CEDAR COMPANY

SAND POINT, IDAHO

CEDAR POL

In All Sizes For All Purposes. Large Stocks. Prompt Shipments. Distributing yards at advantageous shipping points.

The Valentine-Clark Co

(INCORPORATED 1892)

Main Offices

234 La Salle Street, CHICAGO.

Also Central Western Agents for the

TRIPARTITE STEEL POLE

Manufactured by

Franklin Rolling Mill & Foundry Co.

FRANKLIN, PA.

Idaho Cedar Poles

PACIFIC COAST POLE CO.

SPOKANE, WASH.

WE HELP TO MAKE

A Good Telephone

ADDRESS "BARRARM," CLEVELAND

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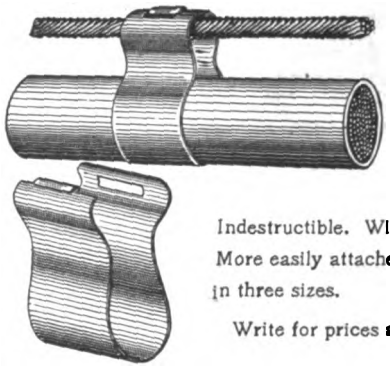
Write us for prices on all telephone parts .. ..

EASTERN TEL. MFG. CO.

WEST CHESTER, PA.



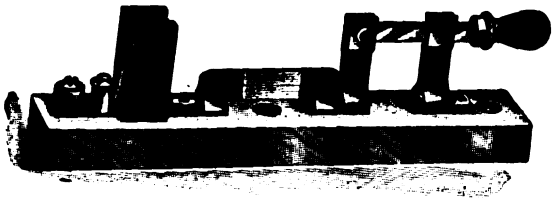
The Pittsburgh Cable Clip

Indestructible. Will not slip on or cut cable. More easily attached than any other. Made in three sizes.

Write for prices and particulars.

BULLARD & McELLIGOTT, . . Room 209
416 Seventh Ave., Pittsburgh, Pa.

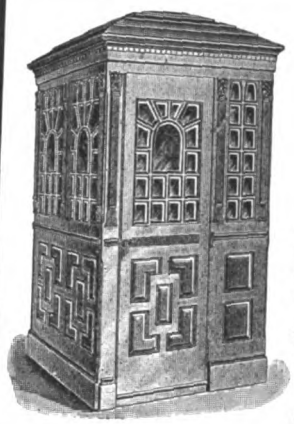
King of Protectors



No. 501 Porcelain Base. Price, each 40c.

Special prices in quantities. Write for circular.

Harvard Electric Company
62 W. Van Buren Street, Chicago, Illinois.



WE MAKE

BOOTHS

(only the sound proof kind)

YOU BUY

OUR BOOTHS

They will do the rest, viz:—more than double your pay-stations receipts. Write for catalogue and prices any way.

W. S. SEAMAN & CO.
216 WATER STREET
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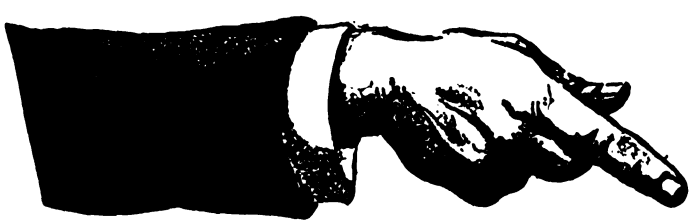
Two Things Every Telephone Man Needs

They are the American Telephone Journal (published weekly), a year's subscription for $1.00, and a copy of the new and revised edition of "The A. B. C. of the Telephone"; a practical book for telephone men. This new edition has been brought thoroughly up-to-date, and sells for $1.00. By a special arrangement we will send a copy of the "A. B. C." and give a year's subscription to the American Telephone Journal—both for $1.50.

$2.00 WORTH FOR $1.50



NOTE.—This offer is not good on Renewals.

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American Telephone Journal
116 Nassau Street, New York City

Enclosed find $1.50. Please send me a copy of the Revised "A. B. C." and a year's subscription to the Journal.

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TRADE MARK.

1889—Paris Exposition Medal for Rubber Insulation 1893—World's Fair Medal for Rubber Insulation

The Standard for Rubber Insulation

Okonite Wires, Okonite Tape, Manson Tape, Candee Weather-Proof Wire

THE OKONITE CO., Ltd., Sole Manufacturers, 253 BROADWAY, NEW YORK

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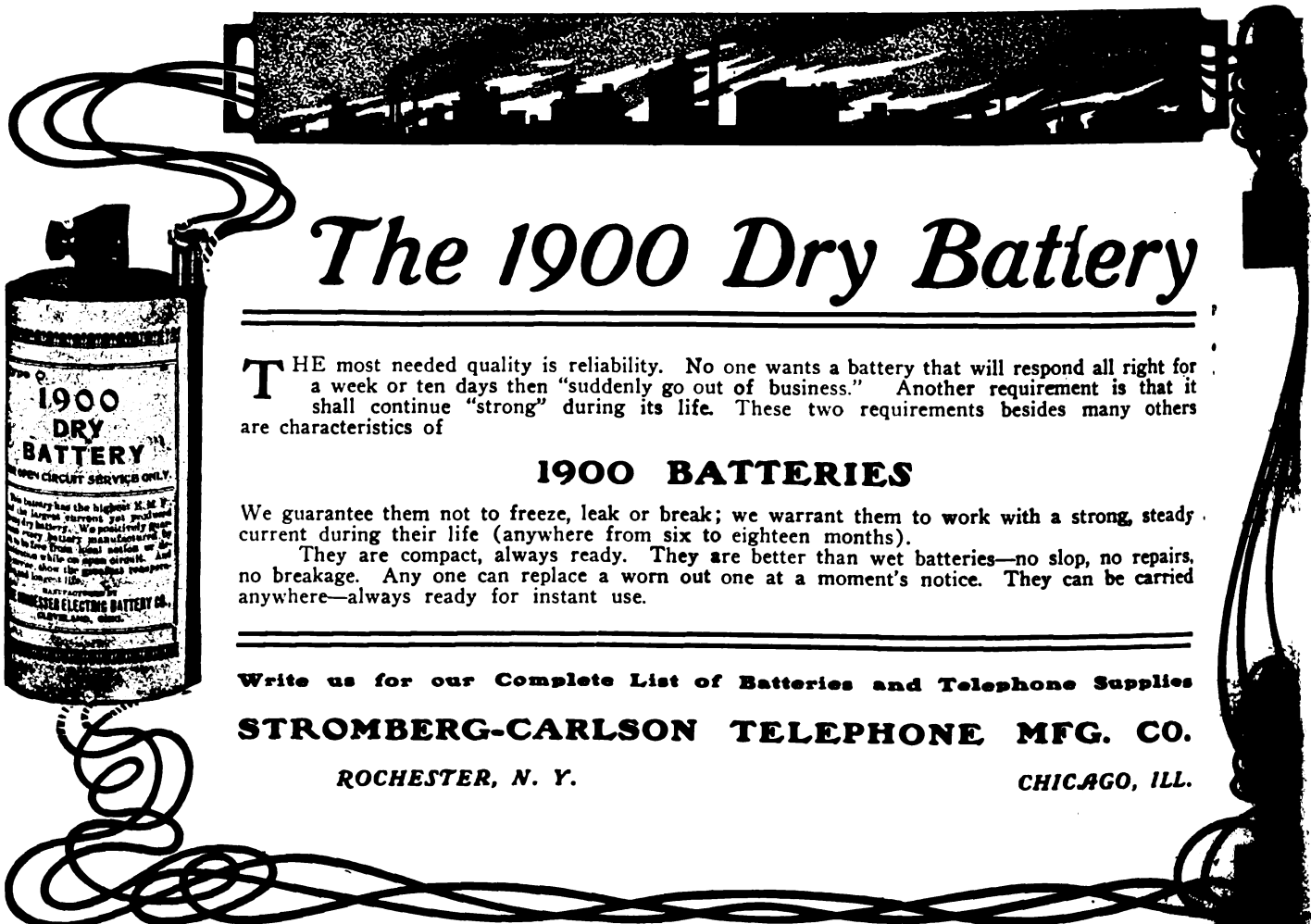
"INTERNATIONAL" PATENT TELEPHONES SWITCHBOARDS

For any size public exchange. Their quality sells our goods

Write for prices and samples

INTERNATIONAL TELEPHONE MANUFACTURING COMPANY

HARRISON AND CLINTON STREETS - - - - - - - CHICAGO, U. S. A.



The 1900 Dry Battery

THE most needed quality is reliability. No one wants a battery that will respond all right for a week or ten days then "suddenly go out of business." Another requirement is that it shall continue "strong" during its life. These two requirements besides many others are characteristics of

1900 BATTERIES

We guarantee them not to freeze, leak or break; we warrant them to work with a strong, steady current during their life (anywhere from six to eighteen months).

They are compact, always ready. They are better than wet batteries—no slop, no repairs, no breakage. Any one can replace a worn out one at a moment's notice. They can be carried anywhere—always ready for instant use.

Write us for our Complete List of Batteries and Telephone Supplies

STROMBERG-CARLSON TELEPHONE MFG. CO.

ROCHESTER, N. Y. *CHICAGO, ILL.*

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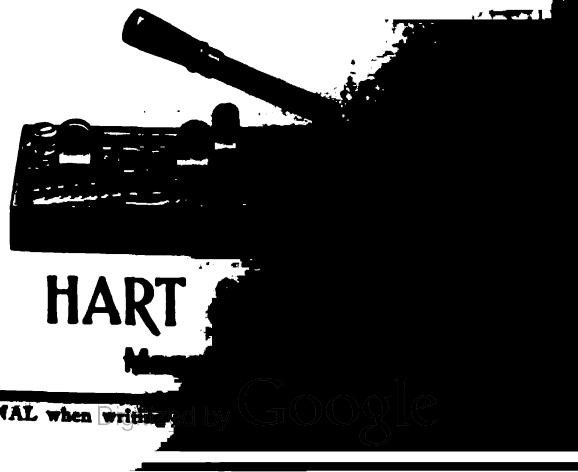
For GROUNDED RETURN and BRIDGING LINES

"TORNQUIST" SINGLE POLE **PROTECTOR**



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Locust and Oak Insulator Pins,
Oak Brackets, Pole Steps
Prompt Shipments. Write for Prices
The W. M. ABSHER CO.
North Wilkesboro, N. C.

M. LANZ & SONS
Manufacturers of GALVANIZED and PLAIN POLE STEPS, BRACES, BOLTS, WASHERS, PETTER DRIVE LAG SCREWS, GUY RODS, GUY CLAMPS, THIMBLES, ETC.
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Minneapolis, Minn.

POLE PRODUCERS.
We are producers and save you the jobbers' profit. That's why our prices are lowest. A trial order will convince you. Also that our *White Cedar Poles* are the finest in the land. Write for prices F. O. B. your town.

MICHIGAN CEDAR CO., Ltd.
BAY CITY, MICH.
CEDAR POLES
We aim to please. Try us with your Order.
Attractive Prices
Prompt Dispatch
Good Quality . . .

BRACKETS--X ARMS--PINS
Little things it is true, but they cut a big figure in line construction.
OUR MOTTO IS:
Prompt Shipment—Quality Satisfaction—Right Price
COLUMBIA MFG. CO. ANTIGO, WIS.

W. C. STERLING & SON
MONROE, MICH.
Telephone Poles
Wholesale Producers 20 Years Eleven Pole Yards

We Rush Orders...
COHN & BOCK
YELLOW PINE CROSS ARMS
Oak Insulator Pins and Brackets

PRINCESS ANNE - - - MARYLAND

Telephone Service for the City of Toronto.
Sealed offers will be received up to noon on
Saturday, October 1st, 1904,
for the installation and operation of a telephone business or service in the City of Toronto, upon terms and conditions which may be obtained from the City Clerk, City Hall, Toronto.
Each offer must be accompanied by a cash deposit, or a marked cheque payable to the order of the City Treasurer, for the sum of $5,000 00.
Any party failing to execute the necessary contracts to carry out his offer in accordance with the terms and conditions of the specifications will forfeit his deposit to the City.
Offers must be addressed to Thomas Urquhart (Mayor), Chairman of the Board of Control, and sent in through registered post.
The City does not bind itself to accept any tender.
THOMAS URQUHART (Mayor),
Chairman Board of Control.
City Hall,
Toronto, Aug. 20th, 1904.

We Make a Specialty of Telephone Poles.
POLES
Large Stock
18 to 25 ft.
4 to 6 in. Tops
For Rural Lines
YARDS:
Menominee, Mich.
Escanaba, "
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Write for Sample Forms and Prices.
The Telephone Printing Co.
DEFIANCE, OHIO.

U. S. LOCK SEAL Cannot be used by unauthorized persons. One key for the President and one for the Secretary. PRICE, $3.00

We Make a Specialty of **STOCK CERTIFICATES** and **BONDS**
THE INTER-STATE CORPORATION RECORD which we publish, contains all forms and blanks for organizing a new corporation.
J. W. MIDDLETON & CO.,
167 DEARBORN STREET. CHICAGO, ILL.

SPECIAL CROSS ARMS
ALL HEART, long leaf yellow pine, any size or length. Also ALL HEART cross ties, oak and locust pins and brackets. Write us for delivered prices.
We can furnish 100 or 100,000 promptly.
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Sales Office, 519 Main Street, Cincinnati, Ohio.

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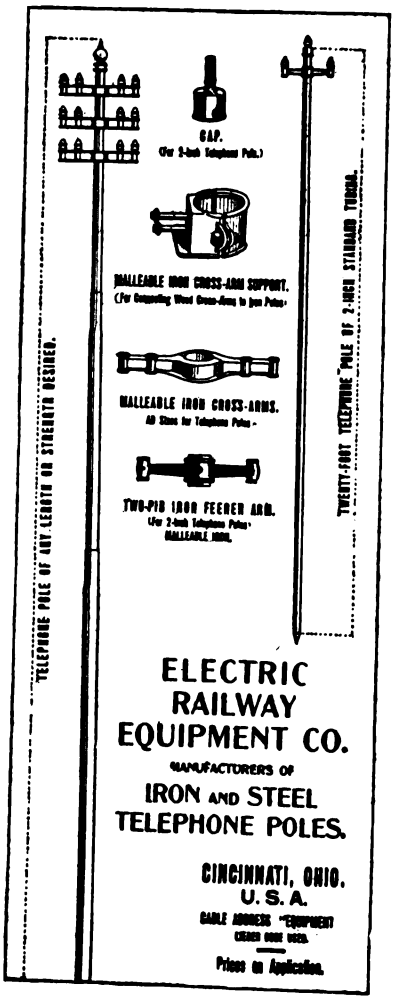

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MANUFACTURERS OF

IRON AND STEEL TELEPHONE POLES.

CINCINNATI, OHIO. U. S. A.

CABLE ADDRESS "EQUIPMENT"

Prices on Application.

The James A. Spargo Wire Co.

Manufacturers of BARE and TINNED

COPPER WIRE

Fine Sizes a Specialty

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Builders of Telephone and Telegraph Lines, Electric Railroad, Power Lines, etc. Conduit Work a Specialty.

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Consulting Telephone Engineer

Plans, Specifications and Supervision of Installation of Complete Telephone Plants

Special Reports on Telephone Properties and Apparatus

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ELECTRICAL ENGINEER AND CONTRACTOR

Complete Telephone Exchanges Built and Material Furnished.

Cable Construction and Underground Conduit Construction a Specialty.

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Read from Atlantic to Pacific; Canada to Mexico; and overflows into all other countries.

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DIRECT READING

Voltmeters, Ammeters, Millivoltmeters, Voltammeters Milliammeters, Ohmmeters, Portable Galvanometers, Ground Detectors and Circuit Testers.

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS AND AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

Weston Electrical Instrument Co.,

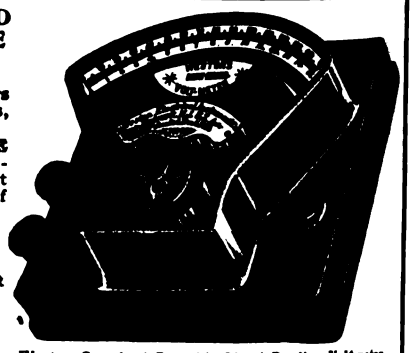
Waverly Park, NEWARK, N. J.

BERLIN—European Weston Electrical Instrument Co., Ritterstrasse, No. 88.

LONDON—Elliott Bros., Century Works, Lewisham.

PARIS, FRANCE—E. H. Cadiot, 12 Rue St. Georges.

New York Office, 74 Cortlandt Street.



Weston Standard Portable Direct Reading Voltmeter.

An Ad.

in a weekly paper reminds the purchaser fifty-two times a year; in a monthly paper, but twelve times.

16 to 1

is a dead issue, but

52 to 12

is not. It is our issue.

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Construction Tools

Write for our Catalogue and Net Price.

We make Linemen's Tools our Specialty.

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AND TELEPHONE SUPPLIES

LINEMEN TOOLS, BATTERIES, WIRE, BRACKETS, PINS, CROSS-ARMS, BRACES, LAG BOLTS.

Quick Shipments. Prices are Right.

HIGH GRADE TELEPHONES AND SWITCHBOARDS.

FARR TELEPHONE & CONST. SUPPLY CO., CHICAGO.

TELEPHONES SOLD BY FARR CHICAGO THAT TALK FAR RING FAR.

Exchange Telephones and Private Line Telephones, Express Switchboards, Gong Switchboards, Large or Small Transmitters, Receivers and Hooks.

A set of Bookkeeping Blanks and Ledgers Free with a $10.00 Order.

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Every bundle of Wire bearing tin tags and lead seals as shown by these photographs is

Guaranteed the Best

and will invariably pass the specifications of the largest telegraph and telephone companies.

The National Wire Corporation

General Offices: Engineering Building, 114 & 116 Liberty St., NEW YORK.

Works: NEW HAVEN, Conn.

Sales Offices and Warehouses: New York, Chicago, Boston, Dekalb, Kansas City, New Haven, San Francisco

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National Battery Co., N. Y. City.
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Telephone Printing Co., Defiance, Ohio.

BONDS.
J. W. Middleton & Co., Chicago, Ill.

BOOKS.
Cantwell Printing Co., Madison, Wis.

BRASS.
Benedict & Burnham Brass & Copper Co., Chicago, Ill.
Scovill Mfg. Co., Chicago, Ill.

BOOTH FAN MOTORS.
Fort Wayne Electric Works, Fort Wayne, Ind.

BOOTHS.
Seaman, W. S. & Co., Milwaukee, Wis.
Ysabera Mfg. Co., Toledo, O.

CABLE CLIP.
Bullard & McElligott, Pittsburgh, Pa.
Hubbard & Co., Pittsburgh, Pa.
National Tel. Supply Co., Cleveland, O.

CABLES.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Chicago Insulated Wire Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
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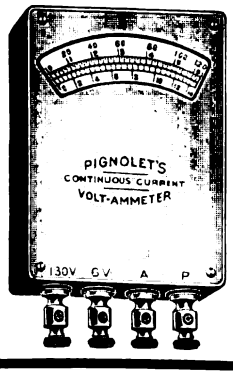

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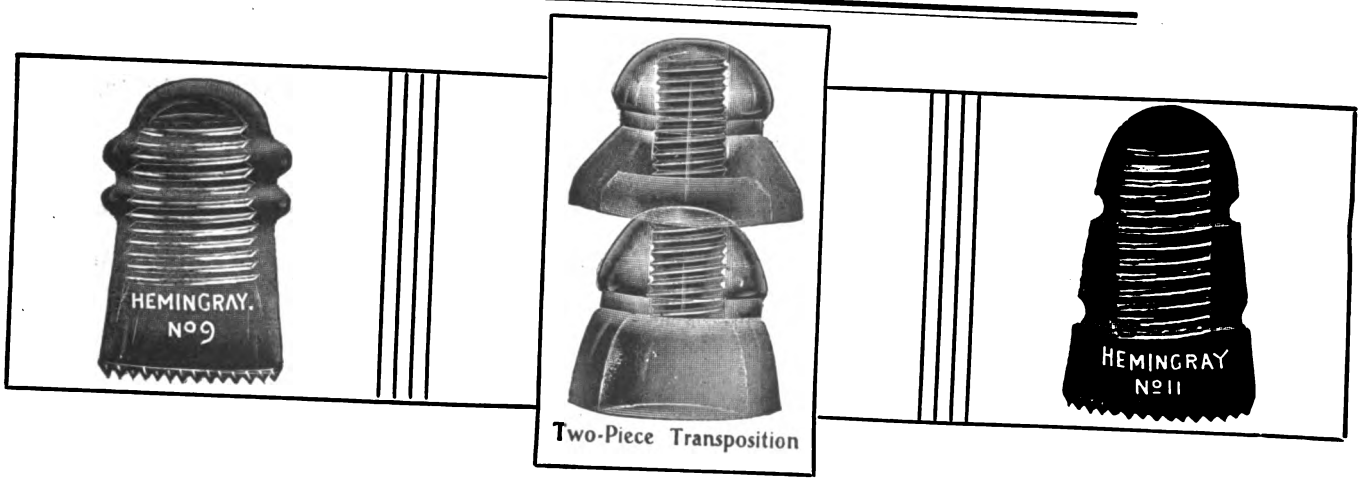

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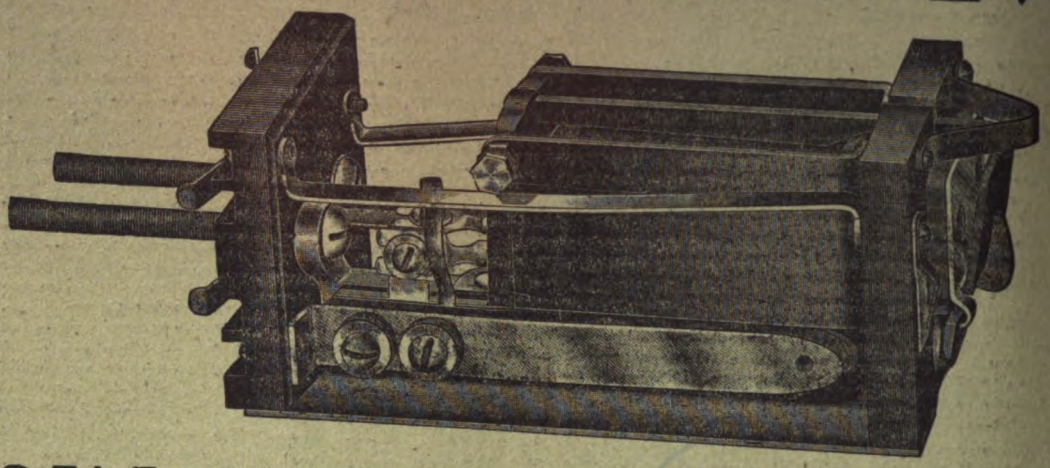

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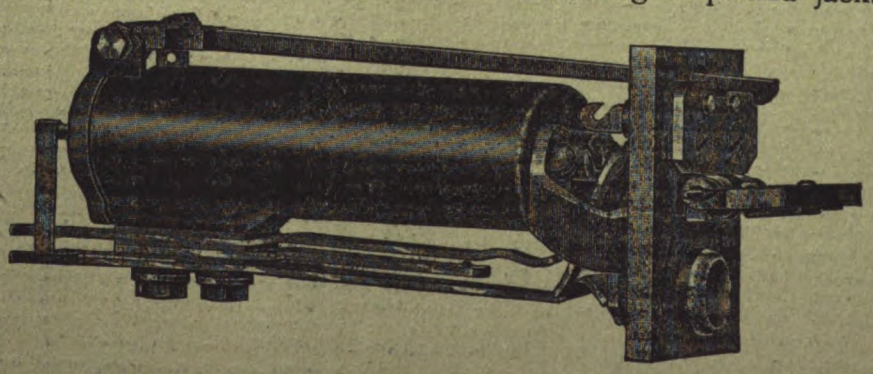

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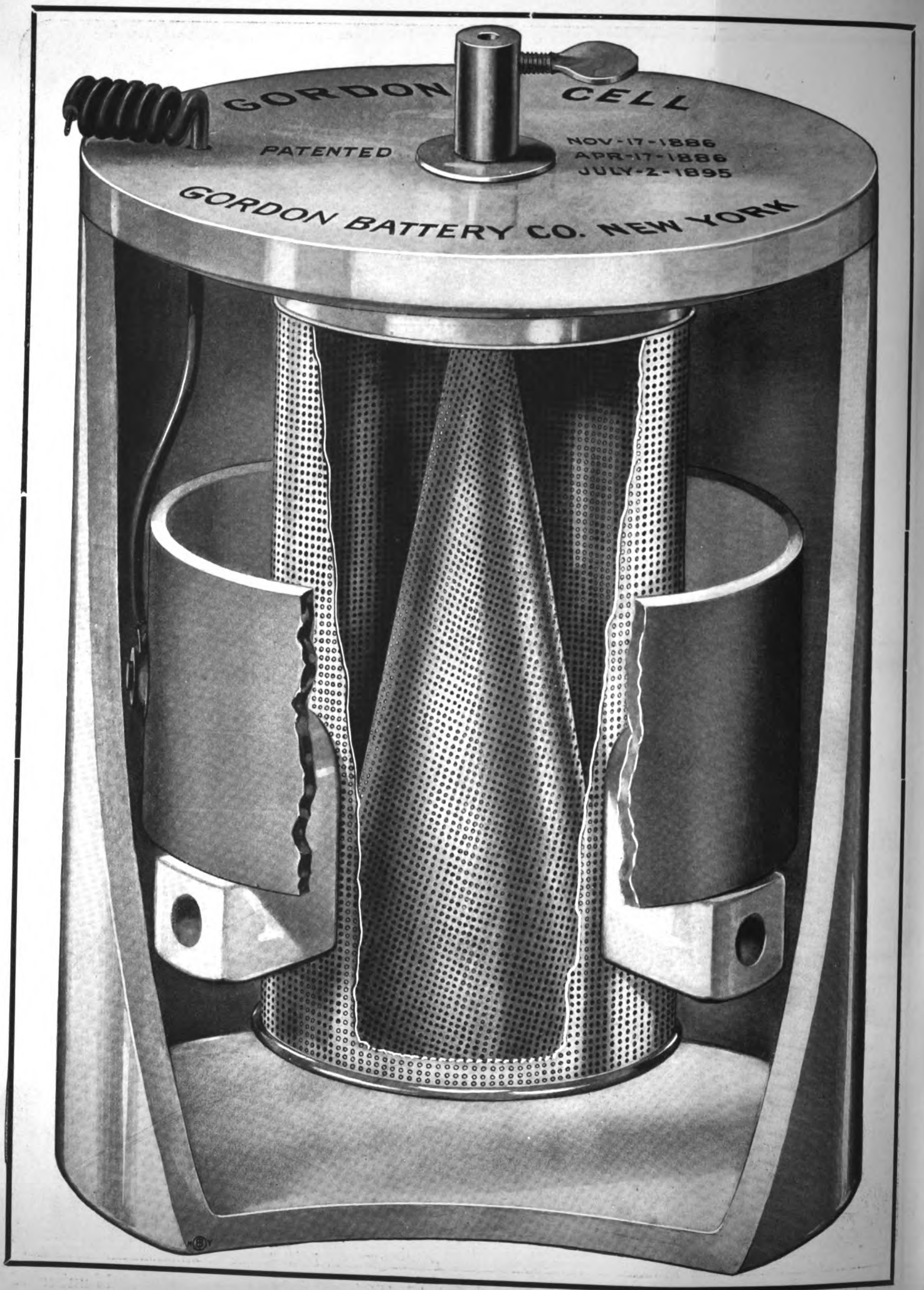

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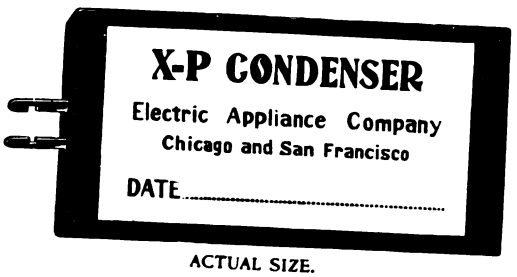

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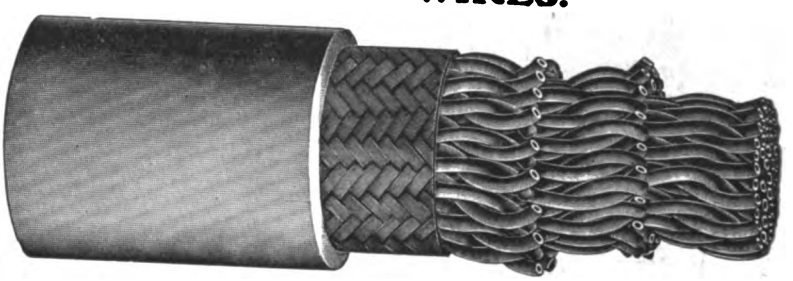

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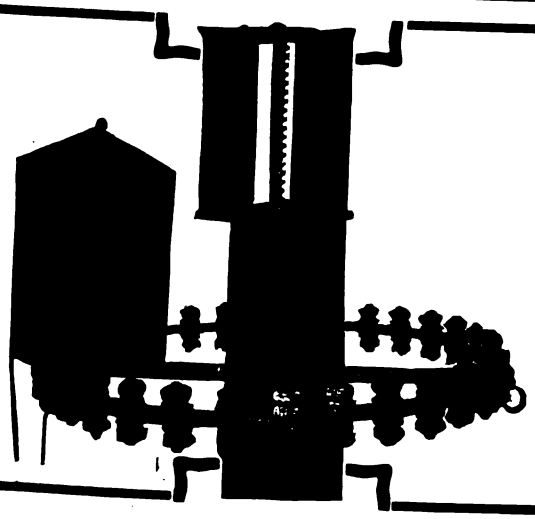

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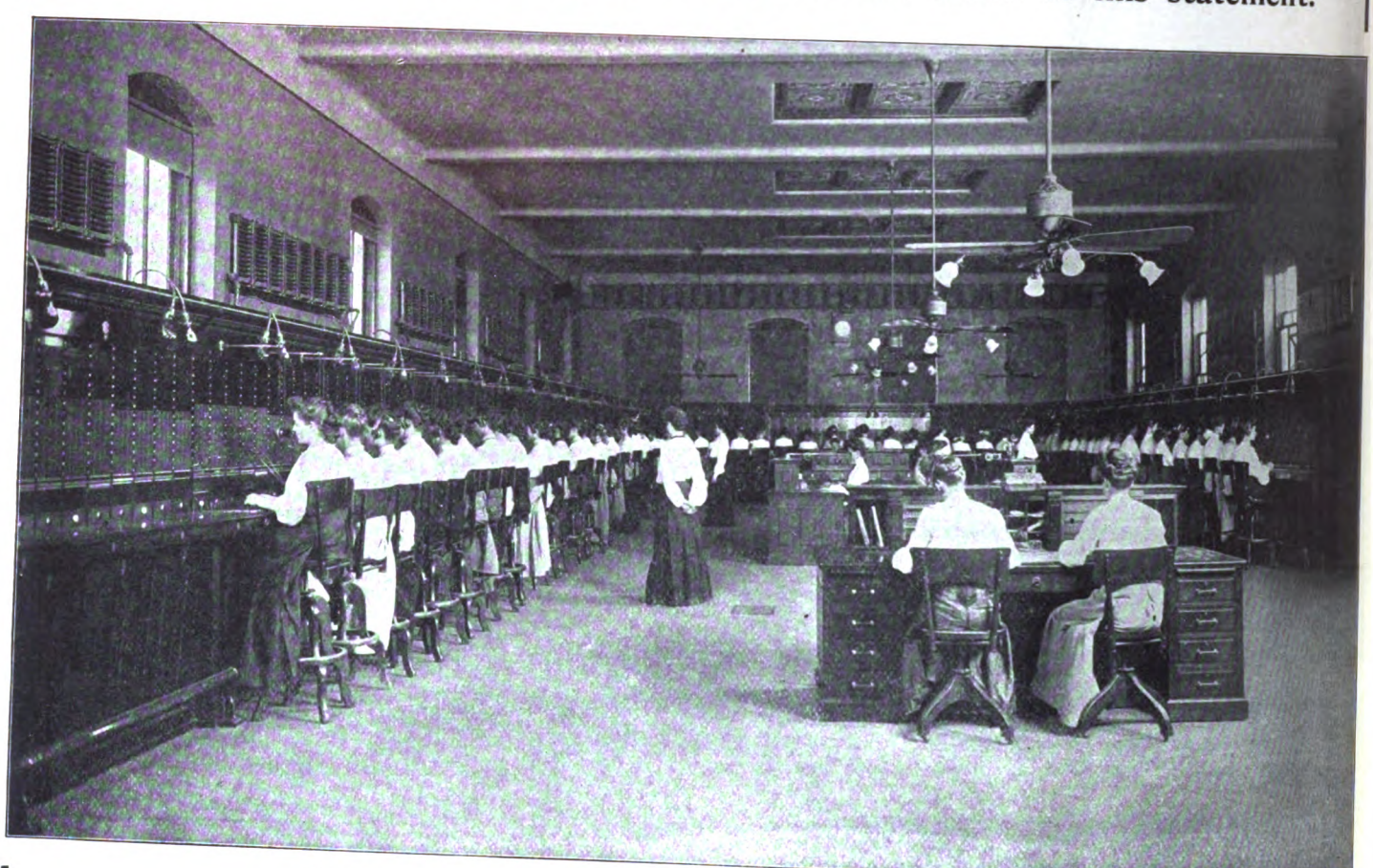

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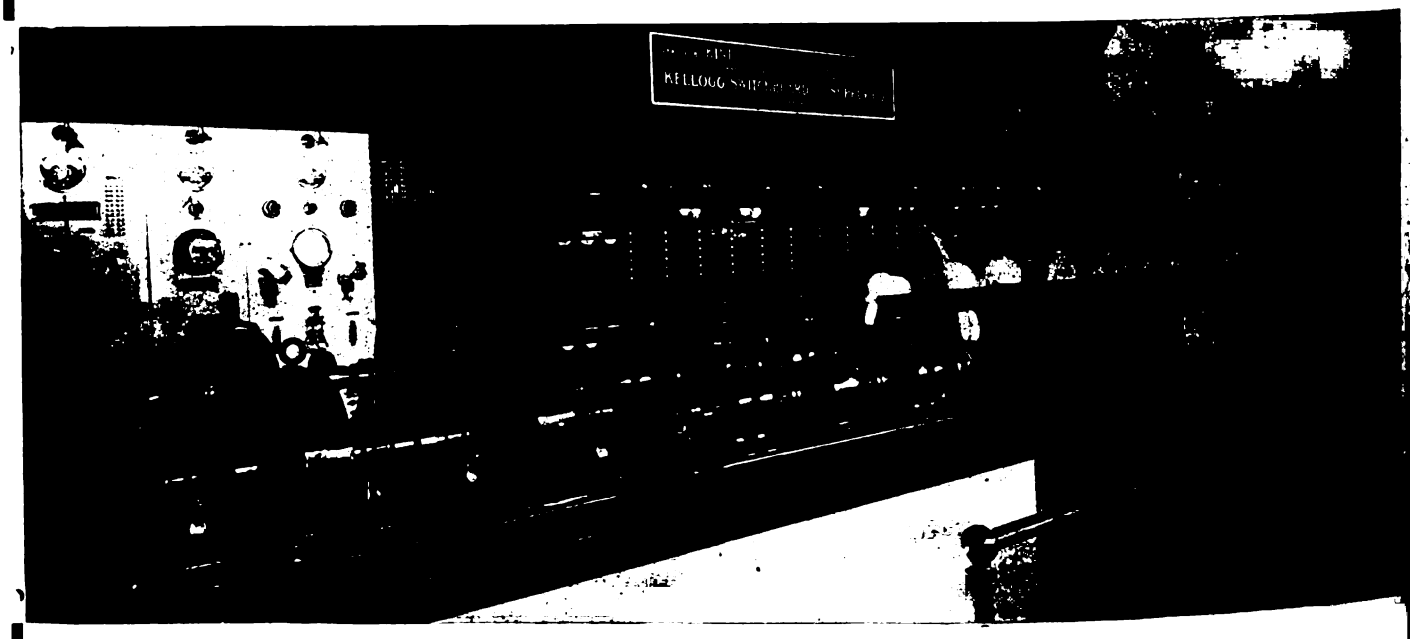

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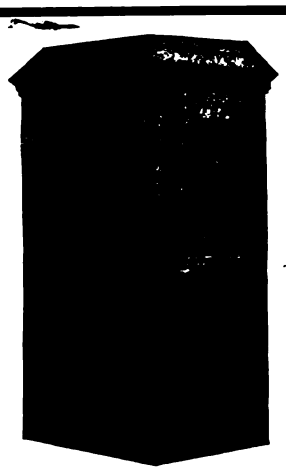

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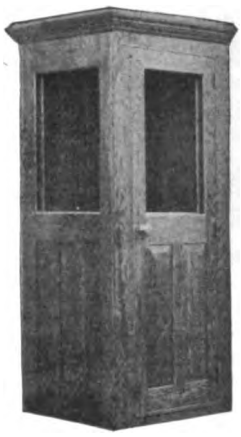

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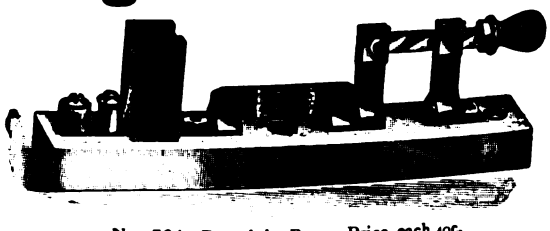

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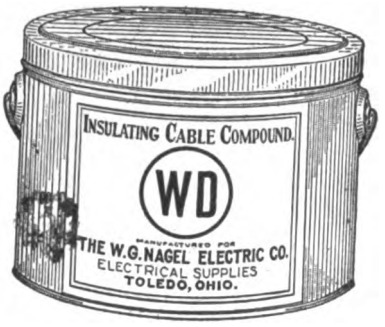

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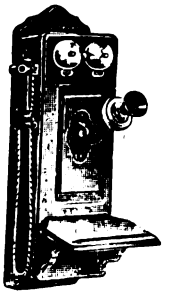

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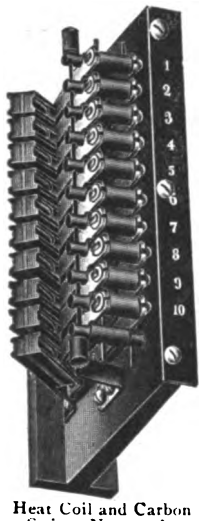

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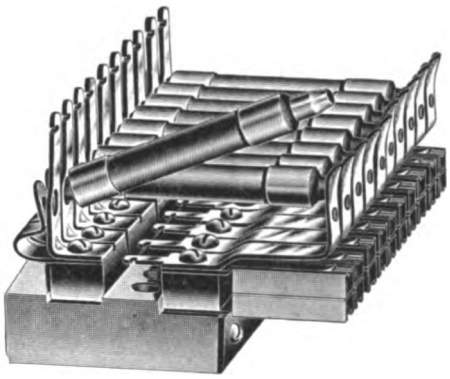

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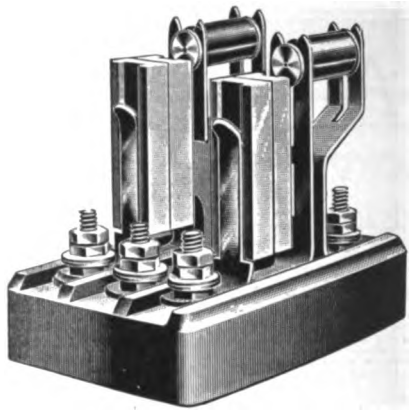

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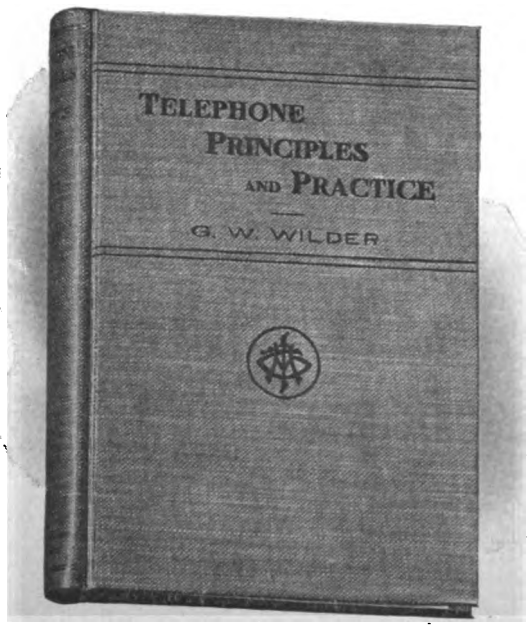

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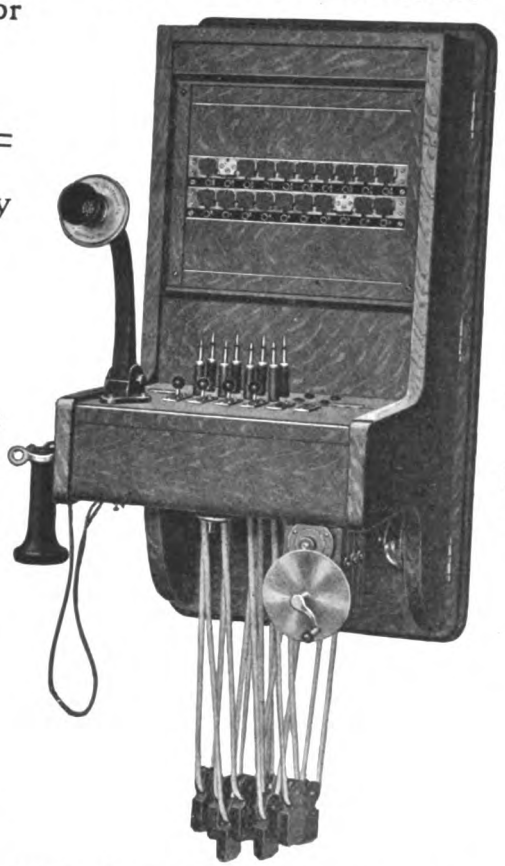

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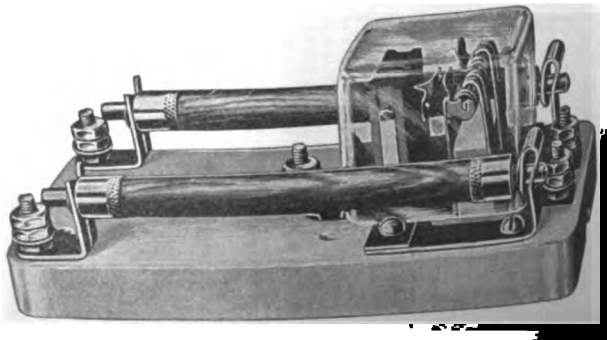

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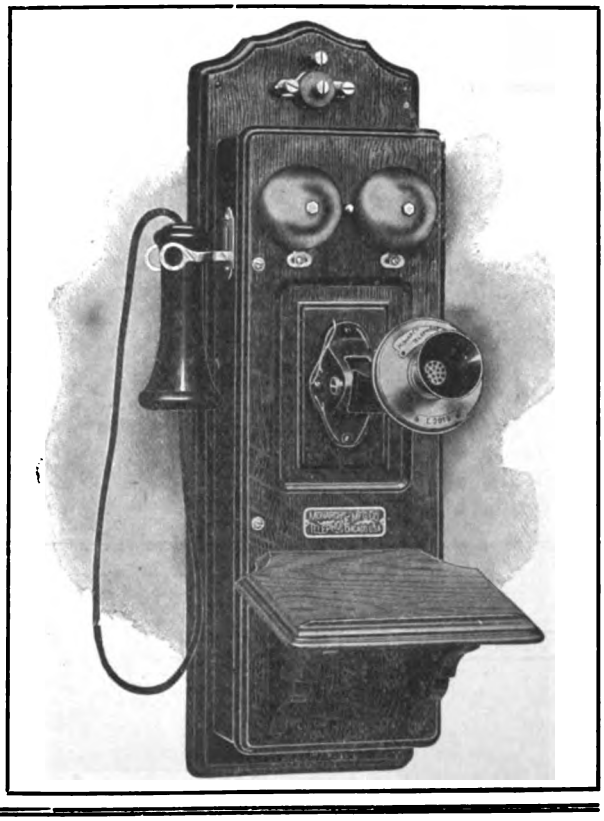

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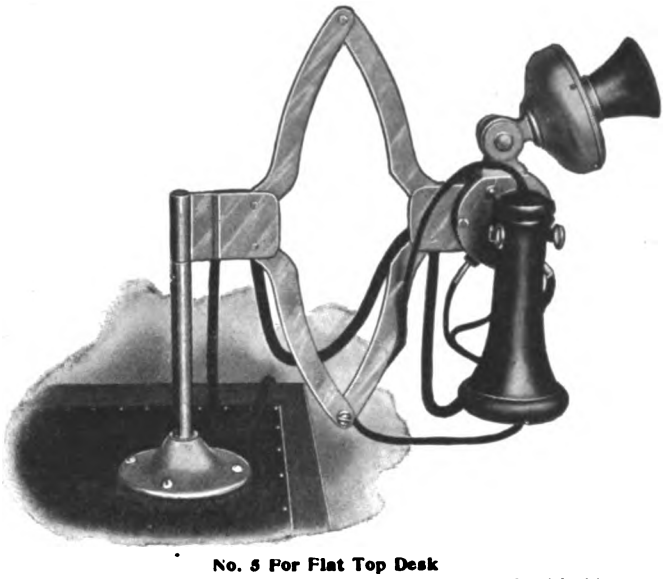

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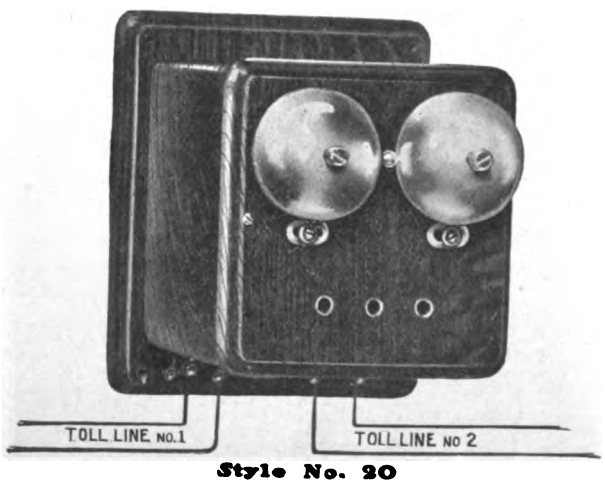

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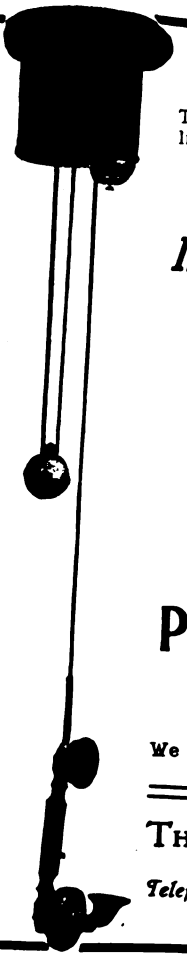

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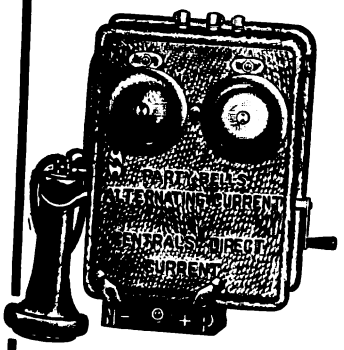

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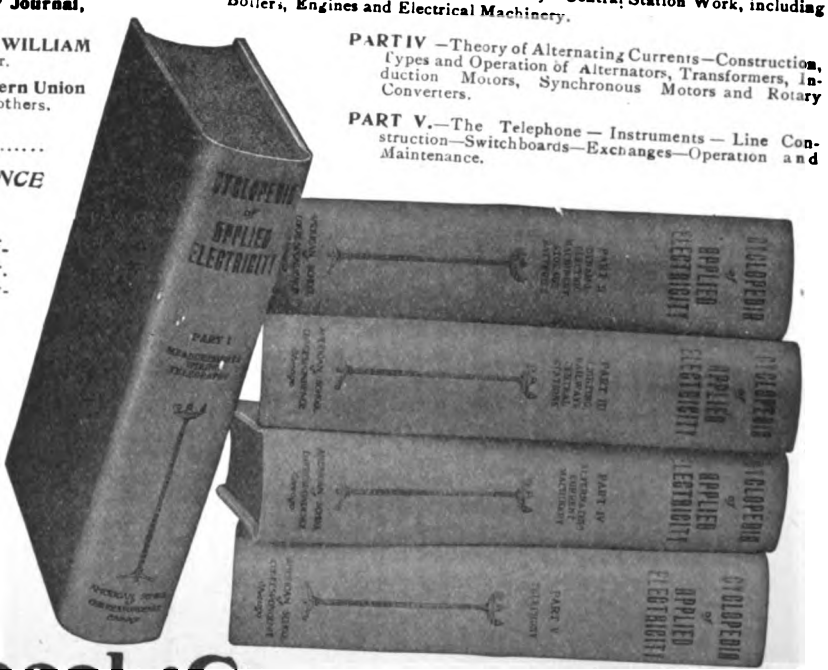

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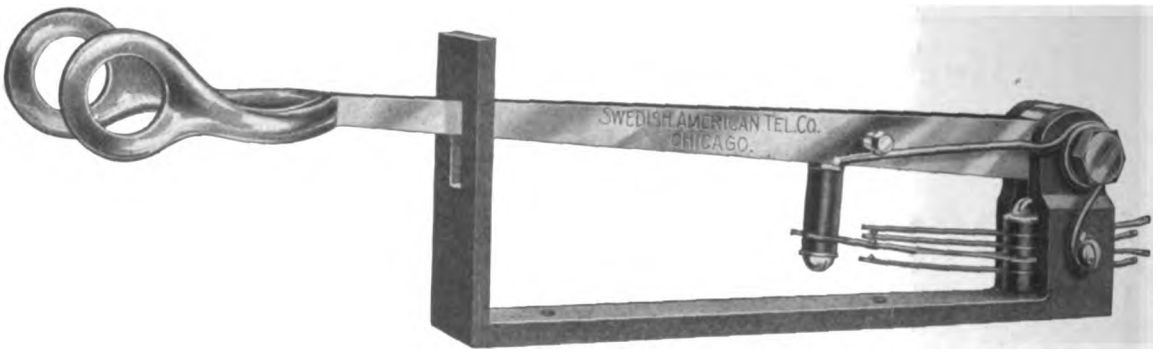

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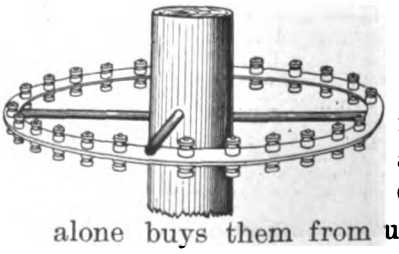

by special machinery, which insures each ring being true and uniform. One company alone buys them from us in 500 lots.

We sell them so cheaply you cannot afford to do without them. We take orders for one ring or 1000, and ship them the same day order is received.

Let us send our catalogue of line specialties and Telephone Supplies.

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VOLUME 10 SATURDAY, SEPTEMBER 17, 1904 NUMBER 12

THE UTAH INDEPENDENT TELEPHONE COMPANY'S EXCHANGE

By Edward A. Tyler.

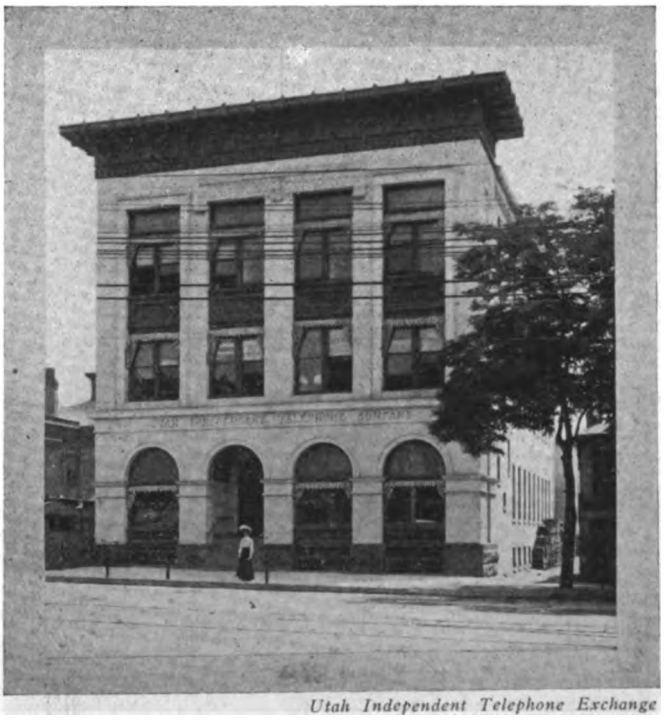
THE Utah Independent Telephone Company was organized in April, 1903, to operate under a franchise granted the preceding December. Its authorized capital stock was $1,000,000, divided into shares of $1 each. All the stock has been issued. No bonds have been issued, although a bond issue of $1,500,000 is authorized under the charter. The conditions of the franchise were 40 free telephones and 1 per cent. of the gross receipts, and its duration 50 years. The officers of the company represent some of the most influential men in the State, and are as follows: Governor Heber M. Wells, president; S. F. Fenton, vice-president; E. L. Sloan, secretary; Hal W. Brown, treasurer; Elmer B. Jones, managing director and counsel. The directors are: Governor Heber M. Wells, Elmer B. Jones, S. F. Fenton, M. H. Walker, E. L. Sloan, John Henry Smith, Geo. T. Odell, N. W. Clayton, Hal W. Brown.

Elmer B. Jones, Managing Director

Contracts for the construction of the entire plant were let to the Stromberg-Carlson Telephone Mfg. Co. Construction was started under the direction of Frank M. Hall, as chief engineer, as soon as possible after the various contracts were awarded and every possible effort put forth to complete the work in the shortest possible time.

Subway construction was begun on August 10, 1903, and completed February 1, 1904, during which time 25,582 lineal feet of subway was built, necessitating 256,963 feet of vitrified single duct tile. During construction difficulties were encountered which severely tried the patience and resources of the engineers. As is well known to many, Salt Lake City lies in a sort of basin presumed to be at one time the bed of a great inland sea, consequently delving into the earth reveals many strange phenomena. In places, excavations as deep as twelve feet revealed alkali dust, while quicksand was a common enemy. Subterranean streams whose existence no one was aware of were frequently encountered. The city is surrounded by the towering snow-capped mountains of the Wasatch and Oquirrah Ranges, and the flow of water is continuous through the Salt Lake Valley. Every method known to engineering was used in prosecuting the work. Where pavements were encountered, lying as they do on a foundation of concrete, a steam drill operated from a portable boiler was used to loosen the concrete, and other up-to-date methods were utilized to hasten the work.

On January 19, 1904, the pulling in of the underground cables commenced, and by June 1, the date of completion, 122,812 feet of cable had been drawn in and spliced. The cables were principally of 100, 150 and 200 pairs, although some 50 and 75 pair cables were used where the demands for service would not be very heavy.



Utah Independent Telephone Exchange

From the very beginning every possible effort was made to facilitate and expedite the work, and with that end in view it was decided to use in place of the old method of cable pulling by hand a 6½-h.-p. gasoline engine hoist. A ⅜-inch flexible steel rope served as a reliable, safe and easily handled cable rope. When in operation the engineer wound 2 or 3 turns of the rope around the drum and kept the slack taken up; at the proper signal when it was necessary to stop pulling, the engineer stopped drawing the slack against the drum and the cable stopped, the drum being allowed to revolve. No trouble at all was experienced in han-

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Toll Room. *Contract and City Department.* *Store Room.* *Operators' Lockers.*

dling it in this manner. The cable crew, with exception of the foreman, were new men taken from the subway gang for the purpose. On January 21, two days after the work commenced, it was decided to ascertain just what could be done under the ordinary conditions met with in cable pulling. For the next 8½ days a careful record was kept by Mr. Hall with the following results:

January 27, the day on which the largest amount of cable was drawn in, the hoist was operated at three different manholes, and the crew which handled the reels, set up at four different manholes. The weather was the most severe of the winter, there being 18 inches of snow on the ground. The best previous record was 7,556 feet of 100 and 120 pair cables installed in 8½ hours by a foreman and 9 men in 1898. No preparations were made before the time of starting other than having some of the cable reels delivered at the point nearest the manholes into which the cables were to be drawn. Each reel had the batting removed, pulling wire attached, and was rolled into position to be mounted on the jacks as fast as the cable was drawn in. The sections between manholes averaged 403 ft. each, and the average time consumed in drawing in was about 6 minutes per section from the time the pulling line was attached until cable was drawn into position. The fastest time made was 4 minutes and 49 seconds. The cable drawn was in every case complete with the pulling wires removed and ready to turn over the joiners.

The Main Switchboard.

The following daily reports give the number of feet and size of cables installed in 8½ days, and will no doubht be quite interesting to construction men, as it shows a departure from the old methods used, in which pulling in from 2,000 to 3,000 feet was considered a good average day's work.

Date.	100 Prs.	200 Prs.	Total Ft.	No. Men.	Time.
Jan. 21.....	869′ 10″	498′ 3″	1368′ 1″	9	4 hrs.
" 22.....	746′ 5″	3470′ 9″	4217′ 2″	"	8 "
" 23.....	414′ 11″	6054′ 4″	6469′ 3″	"	" "
" 25.....	1739′ 1″	3764′ 10″	5503′ 11″	"	" "
" 26.....		6294′	6294′ 0″	"	" "
" 27.....		14919′ 3″	14919′ 3″	"	" "
" 28.....		9270′ 4″	9270′ 4″	"	" "
" 29.....		8863′ 10″	8863′ 10″	"	" "
" 30.....		7360′ 8″	7360′ 8″	"	" "
Total	3770′ 3″	60496′ 3″	64266′ 6″	"	" "

Mr. Hall feels quite confident that with all conditions favorable and a reduction in the number of moves of the pulling apparatus, 18,000 feet can be installed in eight hours with a similar outfit to that which the Stromberg-Carlson Company is provided with. In the instances mentioned there was everything to contend with, so that it is reasonable to suppose that with an experienced crew even better time could be made.

Aerial cable construction was commenced on December 20, 1903, and completed May 15, 1904. During that time 4,325 poles were set, ranging from 35 ft. to 85 ft., Idaho and Oregon selected cedar being used exclusively. Salt Lake City streets being laid out at exact right angles to each other it was possible to devise a symmetrical system. The Great Mormon Temple being the geographical center of the city, the telephone center is somewhat of the same character, accordingly the aerial and underground lines were somewhat easy to design compared to cities where the streets are not laid out in squares.

In all streets running east and west and some north and south in the center of the city, conduits are constructed, and on streets running north and south poles are erected. The poles are located about 100 feet apart, just outside of the trees which line both sides of the streets. These trees grow to immense height, but fortunately have very little spread. Standing at the head of any street away from the main business thoroughfares, they appear like a solid green wall. A 7/16 S. M. steel messenger wire carries the cables, which are fastened rigidly to it, giving the whole installation a most substantial appearance. At frequent intervals along each cable line 10 or 25 pair cables are tapped off and led into hall pole tops, which are enclosed in a galvanized iron can. This contains the fuses and terminals. A galvanized iron distributing ring encircling the pole enables the subscribers' lines to be brought to the pole in a neat manner. No. 14 hard-drawn copper wire, 5/32 rubber weather-proof braid, and twisted of the best quality is used exclusively from the distributing poles to the subscribers, the connection being made inside of the building. *Not one inch* of bare wire has been used in the construction of the plant with the exception of the toll lines.

In connection with the aerial plant the following figures may be of interest. There are 1,063 terminal poles and 316,363 feet of aerial cable, ranging in size from 25 to 100 pairs. The aver-

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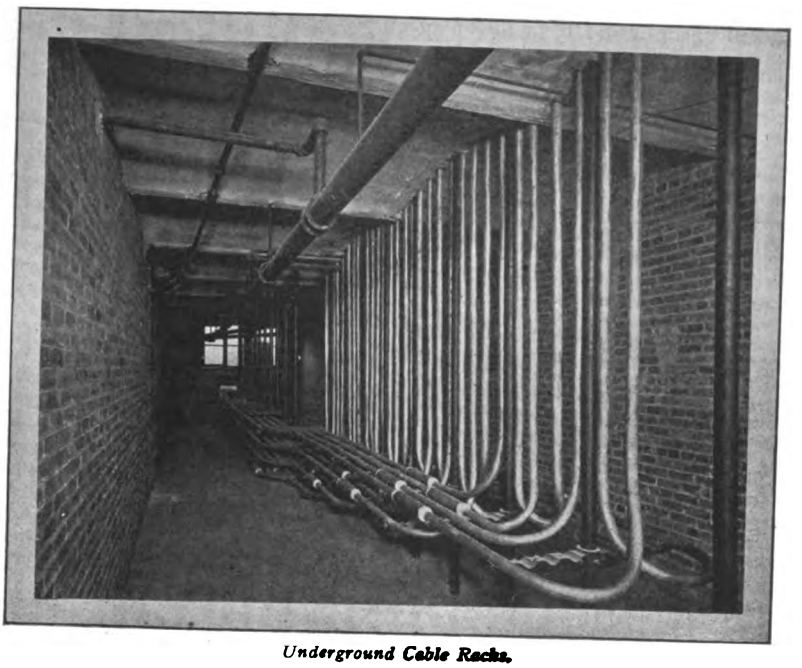
age number of feet strung per working day was 4,400. Total number of taps and splices, 1,594.

Installing the instruments was commenced on May 9, and by August 15, 1,597 had been connected, five private branch exchanges equipped and 17 buiildings wired complete. This was done with a force of six wiremen and three helpers.

The company desired individuality in the matter of the telephones used, and to that end the Stromberg-Carlson Co. designed a special type of black Flemish oak instrument, which is a model of up-to-date telephone apparatus. The several well-known and highly commendable features characteristic of the Stromberg-Carlson apparatus have been retained, especially the circuits and the new transmitter and receiver, with the result that the transmission and operation has already excited the admiration of all users of the instruments. It is so far superior to anything ever experienced before in Salt Lake City that it is a revelation to every one, and will do more to popularize the new instruments than anything ever anticipated.



Underground Cable Racks.

On June 15, 1903, plans were approved for the exchange building, and the contract awarded June 26. Building commenced on July 1, 1903, and was completed on January 1, 1904. The construction throughout is fireproof, expanded metal partitions, steel window frames and casings, fireproof glass, and maple floorings laid on cement being used.

The entrance to the building is through a handsomely designed vestibule, brilliantly lighted by several antique combination gas and electric fixtures of wrought iron. The walls are paneled with marble and the floor is a very beautiful mosaic design. To the left is the office of the Contract and City Department, which is tastefully furnished in mahogany. A handsome bank railing and cashier's desk divides the room and affords callers a ready means of securing information regarding the various departments or liquidating their accounts. In this office is located the Contracting Department as well as the Directory Department, also furnished in mahogany.

Across the vestibule is the public toll room. This is a reception room for the use of the public who desire to call at the Exchange for any purpose. Installed at one end are two booths, in which are located public station telephones. Easy chairs, reading matter and a general air of comfort, make the moments pass quickly when it is necessary to wait for a party.

Between this room and the next room to the west, known as the Toll Room, three plate-glass swing windows have been inserted, which permit parties who wish to make out-of-town calls to give their instructions directly to the recording operator at the toll board.

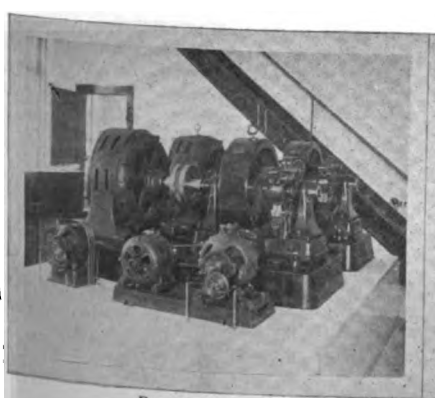
The Toll Room is located in the southeast corner of the building and contains a four-position relay bridged multiple toll board, constructed of highly polished golden oak, with ultimate capacity of 100 toll lines and 40 trunks to the main switchboard in the third floor.

The present equipment for the immediate operation consists of 30 toll lines, 20 outgoing trunk lines multipled and 20 incoming trunk lines. Each position is of the 4-panel type. Calculagraphs are installed in each section of the board. Each keyboard is equipped with 10 pairs of cords and plugs, with associated double ringing and listening keys and double supervisory signals, selector keys, clearing-out drops, etc.

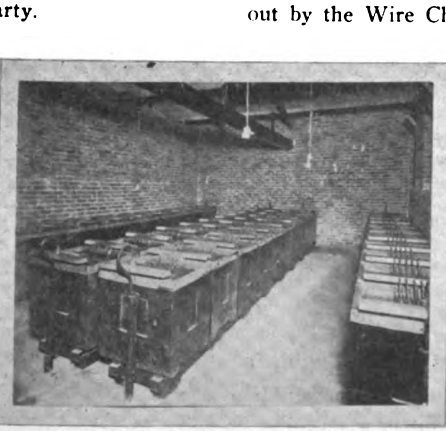
An elaborate system of toll lines and exchanges is outlined for Utah, and considerable work has already been done along this line. At Ogden, Utah, an exchange is being constructed which is an exact duplicate of the Salt Lake City Exchange, except in size, it being built but for 3,600-line capacity, and will be opened about Aug. 1. A substantially built toll line of a capacity of 40 No. 10 copper lines is already built between Salt Lake City and Ogden with 10 pairs of wires strung the entire distance.

At Murray, Utah, seven miles from Salt Lake City, a Central Energy lamp line signal exchange is under construction, and will be opened within a few days. A first-class copper construction toll line is already built past Murray, and several miles south of that point. Franchises have been secured at Bountiful, Kaysville, Farmington, Provo and in all the prinicpal cities and towns of Utah, and work is proceeding as rapidly as possible. Sixteen exchanges will be built in Utah in the next few months, together with toll lines connecting them together, thus supplying a very complete Independent system.

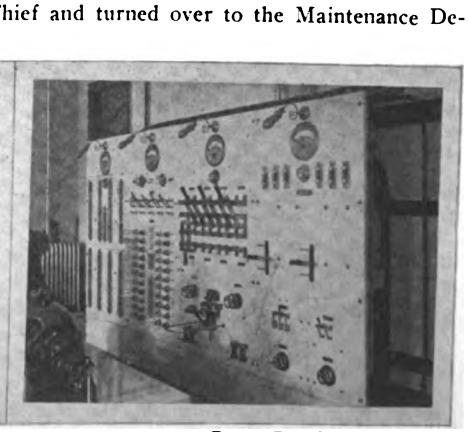
The offices of the Engineering Department are situated on the first floor, and include the office of the Superintendent of Construction and of the Superintendent of Equipment and Maintenance. All the records of the various lines and instruments are kept here, and the orders for all the work done by the employees of the departments, including the trouble which has been tested out by the Wire Chief and turned over to the Maintenance De-



Power Apparatus.



Storage Battery Plant.



Power Board.

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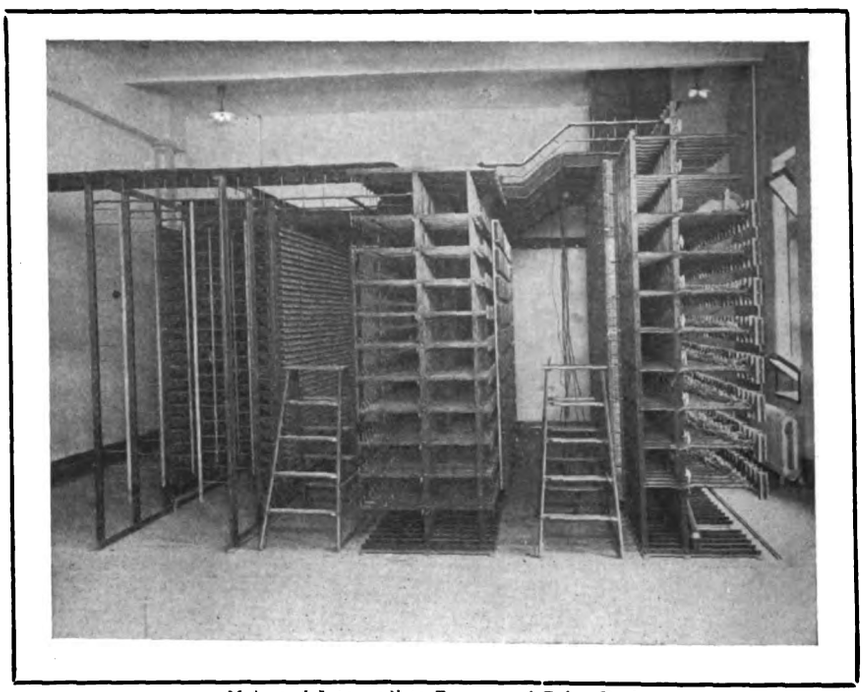
partment for their further attention, are issued from this office.

The large stock room is situated to the rear, and contains the various instruments and supplies, and the many different articles necessary for the equipment of an exchange. Underneath is a large store room, which is reached by a short flight of iron steps, and a large freight elevator, capable of handling many tons of freight, and is used for storing cable material and other heavy stock. Two sides of the room are occupied by a number of commodious lockers for the installers and other employees. Adjacent to this room and opening into it is the boiler room, in which is installed a 25-h.-p. boiler for heating the building. An auxiliary heater, to be used during the summer, is also provided. A dust-proof air-tight brick room is used for coal storage and has a capacity for several tons.

Besides the large store room the basement contains the storage battery room, which is adequately provided with facilities for carrying off the gases generated by the battery, a special brick flue being used for the purpose.

The battery is arranged in two sets, each set consisting of 20 cells of type G-23 accumulators in lead-lined tanks, having an ultimate capacity sufficient to operate the 12,600 lines for a period of 24 hours without recharging. The duplicating of the plant insures continuous service and is well worthy of emulation by other telephone companies.



Main and Intermediate Frames and Relay Racks.

Adjoining the battery room is the cable terminal room. The cables entering from the street are supported on iron racks, supported on steel posts extending the entire length of the room and running from floor to ceiling. There are 60 ducts entering, which permit of 24,000 lines being accommodated. The cables are separated from each other the same distance through their entire length. Before being turned up to enter their respective openings in the floor of the Wire Chief's room, a wool cable is spliced to the underground which leads to its respective group. The entire arrangement of the cables is most practical and reflects great credit on the designers.

Where the lightning and power wires enter the basement from a special conduit there is a white Italian marble panel, equipped with everything necessary in the line of switches, fuses, lightning arresters, and the volt and ammeters of the glass-faced type.

The wire chief's room is situated on the first floor directly over the storage battery and cable rooms, and contains, besides the wire chief's desk, the main and intermediate distributing frames, relay racks and power apparatus.

The lines entering the building through the underground cables terminate in groups of terminals corresponding to the number of that particular cable at the main distributing frame. This frame has a present capacity for 6,400 lines, and an immediate equipment for 4,000 lines. Provision has been made for terminating on the switchboard side combined carbon and sneak-current arresters of the Cook type, mounted in strips of 200 pairs each, providing 4,100 pairs of lightning arresters at the present time, one strip of 100 pairs for the toll lines and 20 strips of 200 pairs for the central energy lines. The cable side is equipped with terminals mounted in strips of 25 pairs each, equipped at the present time with 6,000 pairs, providing terminals for 30 200-pair cables. Provision has been made for increasing the main frame by adding additional sections of 800 capacity each whenever desired.

The intermediate distributing frame has a capacity of 6,400 lines and has installed thereon the necessary line and cut-off relays for 4,000 subscribers' lines, enclosed in dust-proof cases, provision being made for adding additional sections of 800 lines each. A special iron frame running from the main frame through a brick shaft conveys the cables to the main switchboard.

The wire chief's desk is situated at the east end of the room, and consists of two positions with the following circuit arrangements for testing:

Incoming desk trunks, 20; desk trunks local to other desks, 20; desk trunks outgoing, 20; test lines to main frame, 10; test plugs to main frame, 10; test plugs to multiple board, 10; multiple test plugs, 10; cable test lines, 20; test cords, 10; Howler cords, 4; order wire circuits, 20; line pilots, 2; ringing pilots, 2; switching keys, 1.

Each of the two positions is provided with a Weston portable volt-ammeter No. 3, with scales 0-150 volts, 0-3 volts and 0-1.5 amperes.

All incoming trunks to the desk terminate at listening keys with associated lamps and are connected with the corresponding outgoing multiple jacks in the main switchboard. Besides the numerous circuits already mentioned there is a 1/6 S. dynamotor, the generator having an output of 100 volts direct current to operate from the 40-volt storage battery to be used in connection with cable and other tests.

The power plant consists of two complete duplicate sets of charging apparatus, each consisting of a 20-h.-p. type "I" 8-pole 60-cycle 3-phase 200-volt alternating current induction motor, direct connected by insulated couplings to a type "H" multipolar generator, delivering an output of 12 k. w., furnishing 200 amperes at 60 volts.

The ringing apparatus consists of 1 type 1 B. R. self-exciting ringing dynamotor belt connected to a 1 h.-p. 4-pole type "I" 200-volt 60-cycle 3-phase full load automatic start alternating motor, the generator having an output of 110 volts alternating and direct current at 110 volts for party line signaling if desired. Also one type 12 T. R. ringing dynamotor.

To the right of the power plant is a 4-panel power board built of white Italian marble. The four panels are mounted on an iron supporting frame and contain the necessary switches, rheostats, volts and ammeters for control of the various circuits.

On the second floor are situated the offices of the company, which occupy the front of the building. They are handsomely furnished, solid mahogany furniture being used in the Directors' room, Managing Director's office, Local Manager's office and General Offices.

The Auditing and Collection departments are on the north side of the building, as is the Legal Department. The locker room is on the south side of this floor, and is used exclusively by the Operating Department. Opening off the locker room are large and attractive dressing and toilet rooms, and adjoining is the dining-room, capable of accommodating a large part of the operating force. Connected with this room are the kitchen and pantry

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which are fitted up in a first-class manner and in charge of a competent chef.

The main switchboard is situated on the third floor in a room 48 by 98 feet, entirely fireproof, there being no woodwork exposed except the flooring, which is of polished hard wood laid upon a fireproof flooring of six inches of concrete.

Abundance of light and air is provided by means of twelve windows around the three sides of the operating room, besides two ventilating skylights. The ceilings are 25 feet high, supported by three steel columns, around which are grouped the radiators, the entire building being heated by the hot-water system.

The switchboard, manufactured by the Stromberg-Carlson Telephone Mfg. Co., is constructed of highly polished golden oak, special care being used in selecting the wood. It has an ultimate capacity of 12,600 lines, and is equipped for the immediate operation of 4,000 subscribers' lines, distributed in thirty-four operators' positions, with 120 lines to each position.

There are fifteen sections of three operators' positions, each with nine panels in the multiple trunk and answering jack space, arranged as follows: The first position of the first section serves as a multiple annex position. The second and third positions for incoming trunking positions. Each of the remaining positions are wired and equipped complete for 120 lines each.

Each "A" operator's equipment consists of an operator's talking set, including solid back transmitter, head telephone and band attached to an operator's plug, two operator's cut-in jacks wired in multiple and so arranged that when the operator's plug is removed from either jack, the telephone battery circuit is opened.

Each "A" operator's keyboard in use is equipped with fifteen pairs of connecting cords and plugs, double lamp supervisory signals and ringing and listening keys with associated cord apparatus, and ten order wire keys with an ultimate capacity for twenty. Each equipped "A" operator's position has three supervisory pilot lamps mounted in the bar below the answering jacks, one line call pilot, one disconnect supervisory pilot and one ringing supervisory pilot to light when the operator rings, all wired into the night bell circuit.

Below the multiple jacks is space for 360 outgoing trunk jacks in each section, and underneath are mounted the line lamps and answering jacks in strips of ten, there being space for 150 lines, 120 being equipped at the present time, forty in each of the three panels.

There are 60,000 multiple jacks in the present equipment, with space provided for the full ultimate equipment of 12,600 lines. Spring jacks are used with German silver thimbles and individual springs for both tip and sleeve side of the line. The multiple jacks are mounted in strips of twenty, with 3/8-inch centers.

In each of the fifteen sections there are two strips of twenty outgoing jacks connected in multiple for outgoing trunks to the supervisory desks, with designation strips, five to the Chief Operator's desk, fifty to the Information Clerks' desk, five to the Trouble Clerks' desk and five to the Wire Chief's desk.

The supervisory desks of the Chief Operator, Combination, Information and Trouble Clerk and Monitor Operator are standard two-position desks of highly polished quarter sawed golden oak with hinged keyboards.

Steel frames are used for mounting the jacks and lamps, and ample drawer space is provided. File cases are set in each desk for 12,600 cards, and covered by a sliding panel when not in use. Each desk is suitably lighted by overhanging desk brackets. Their equipments are as follows:

Chief Operator's Desk—Incoming trunks, 20 multiplied. Desk trunks, local to other desks, ultimate 20, present 12. Desk trunks, outgoing 20, multiplied. Exchange lines, 10. Cords, 10. Monitor circuit jacks, 120. Order wire keys, 120. Special incoming order wires, 4. Operators' circuits, 2. Pilot lamps, 2. Ringing pilots, 2. Switching keys, 2.

Information and Trouble Clerk's Desk—Incoming trunks, 10; desk trunks, local to other desks, ultimate 20, present 10. Exchange lines, 10. Cords, 10. Observing lines, 10. Operators' sets, 2. Call pilots, 2. Ringing pilots, 2. Switching key, 1.

Monitor's Desk No. 1—Desk trunks, local to other desks, 20. Listening in jacks, 60. Monitor pilots, 60. Supervisory pilots, 60. Monitor keys, 60. Desk cords, 10. Operators' sets, 2. Call pilots, 2. Ringing pilots, 2. Switching key, 1.

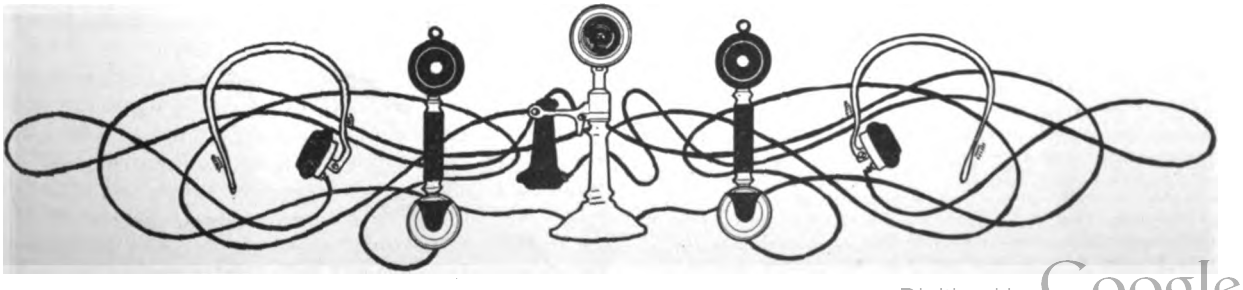
Monitor's Desk No. 2—Desk trunks local to other desks, 20. Listening in jacks, 60. Monitor pilots, 60. Supervisory pilots, 60. Monitor keys, 60. Desk cords, 10. Operators' sets, 2. Call pilots, 2. Ringing pilots, 2. Switching keys, 1.

Besides the regular equipment of the Chief Operator's desk are means for making service tests, lighting the subscriber's lamp without signaling the subscriber, circuits for calling subscriber direct from the desks, and testing service from the multiple in connection with outgoing trunks, etc. The Monitor circuits are so arranged that the operators receive no indication of the test being made. Order wire keys connect the switchboard with the various desks. The Trouble Clerk positions are wired and equipped for observation lines, so that when the subscriber calls in the white lamp in front of the observation operator associated with the jack is lit, and also the regular line lamp in the operator's position. This observation lamp remains lit until the operator answers and stays out during the conversation.

The second and third positions of the first section are reserved as "B" positions. Each position is fully equipped with twenty-seven incoming trunks, each consisting of a plug and cord with associated ringing and disconnect supervisory lamp and ringing and listening key.

Located in each section of the switchboard is a push button, connected to a special fire alarm circuit, which is attached to the apparatus at fire headquarters. When the subscriber wishes to summon the Fire Department "Central" is called and informed. The operator pushes the button, which releases the horses, at the same time striking the gong. She then inserts a plug in line No. 19, which action calls Fire Headquarters. The location is announced and the alarm is given. A 6-inch Gamewell fire alarm gong is placed on the second floor. This is connected to the regular fire alarm circuits so that alarms are received at the exchange the same as at the Fire Department. Subscribers can learn of the location of fires within a few seconds after the box is pulled. In connection with the Information Clerk's desk is an Information Bureau. This is maintained day and night and promises to become one of the most popular features of this up-to-date exchange.

The complete and satisfactory manner in which everything was installed reflects credit upon the Stromberg-Carlson Co., and it may well feel proud of its work in connction with the Salt Lake City plant.



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THE SITUATION AT OMAHA.

THE Bell Telephone Company, through the medium of its press bureau, is pounding away steadily against the proposition to establish a competing telephone system in the city of Omaha, Neb. Day in and day out, the Omaha *Bee*, which in this fight is the paid spokesman of the Bell interests, publishes articles ranging from one to two columns in length, setting forth the evils that must result to the people of Omaha if the franchise asked by the Independents is granted. These articles appear as usual in the guise of "special correspondence" from other cities. One of the latest specimens in this series of "special correspondence" is dated from Kansas City, Mo. It occupies nearly two columns of space in the *Bee*, and there are about it no indications that the matter is advertising, pure and simple, paid for at special rates by the Bell Telephone Company. It is, perhaps, unnecessary to comment upon the fact that a paper of the standing and position of the *Bee* should wantonly sell its columns to a concern that is notoriously robbing the subscribers of the paper, among others, but it does seem as though a newspaper editor who has had as much to say against the exactions of corporations and the high ideals of government as has the proprietor of the *Bee*, would refrain from deliberately imposing upon the people who support his property. However, that question has come up so often before in other cities and with other newspaper proprietors that it is not worth discussing. The main thing is to point out the deliberate misrepresentations that are made in this so-called "special correspondence."

The editor of THE AMERICAN TELEPHONE JOURNAL, in order to bring the matter squarely to an issue, submitted the article on the alleged situation in Kansas City to Mr. O. C. Snider, vice-president and general manager of the Kansas City Home Telephone Company, and Mr. Snider's reply is given below.

Among other things, the alleged "special correspondent" of the *Bee* had this to say, under a Kansas City date line:

> The Home Telephone Company of Kansas City has an authorized capital stock of $3,000,000, of which $1,700,000 has been issued, the remainder being held in the treasury ostensibly for future "extensions and improvements." The company has bonds outstanding to the amount of $1,700,000, and at *6 per cent.* this indebtedness places an interest charge of $102,000 a year on the company. As near as can be learned the company has in service at Kansas City about *3,500 business 'phones* at $54 each per year, and about *1,500 residence* 'phones at $36 per year each. This would produce a revenue from the local exchange of about $243,000. Allow $57,000 to cover the revenue from toll lines and any underestimate of the local business, and we have a total yearly income of $300,000. According to the annual statement of the Missouri & Kansas Telephone Company, it required 77 per cent. of the revenue from exchange and toll lines to pay the expense of operating and maintenance. To be liberal, estimate the operating and maintenance expense of the Home company at 70 per cent. of its revenue from exchange and toll lines, and the charge will amount to $210,000. The franchise of the new company requires it to pay the city 2 per cent. of its gross receipts, and this makes another charge of $6,000 a year on a business of $300,000. Roughly estimating, therefore, we find the following expenses to be paid from an income of $300,000 a year:

Interest on bonds	$102,000
Operating and maintenance	210,000
Royalty to city	6,000
Total	$318,000

> The new company, which began operations in January last, has about *5,000 subscribers in the city*, while the old company has over 10,000 subscribers, having lost about 900 on account of the competition.
>
> The Home company has toll line connections with less than 200 towns, while the Missouri & Kansas reaches nearly 1,100 towns and cities. It is this immense discrepancy in outside connections that puts the new company at a disadvantage and makes the service of the old company indispensable to a great many business houses.

The foregoing statements are picked out at random from the mass of misinformation contained in this particular article, which, as stated before, is one of a regular series that has been put out in Omaha, as similar series have been put out elsewhere when Independent competition threatened. Discussing these "facts," Mr. Snider writes us:

> I have received your letter of the 1st inst. enclosing clipping from the Omaha *Bee* concerning telephone interests here in Kansas City. The article is a gross misrepresentation of the true condition of affairs here.
>
> In the first place, the financial side of the matter is distorted. The interest on our bonds is $85,000 per year, as the rate is 5 per cent., and not 6 per cent. Furthermore, instead of having 5,000 telephones in service we have more than 9,000. We are not only paying our operating, maintenance, and all fixed charges, but are showing a dividend on our stock.
>
> We are adding new subscribers to our system at the rate of 600 per month, and long before January 1st we will have more than 10,000 telephones in service. Comparing the directories of the two companies, which is a fair basis, we find we have more telephones in service at the present time than the other company. The Bell Telephone Company has lost a great many subscribers, and is doing everything within its power to retain those still in service. It is offering a great many inducements to new subscribers, among them being free service for a period of three months, whereas the Home Telephone Company gives no free service whatsoever.
>
> In the States of Missouri and Kansas the Home Telephone Company has long distance connections with many more telephones than the Bell Company, as in a great many cases our long distance lines connect with exchanges in different towns, whereas the Bell Telephone Company's lines merely have pay stations.
>
> It has been necessary for us to double the capacity of our plant during the past six months in order to provide facilities for our rapidly growing list of subscribers. This is the best evidence of our success, and we are giving no free service.

We commend this matter to the careful attention of those Independent operators who have to meet such methods in their own territory. We doubt that the situation in Omaha will, in the end, be influenced adversely by such tactics. The same sort of campaign has been waged in a great many other places, in fact is being waged in half a dozen different places at this very time, but so far as finally keeping out competition is concerned, the work has invariably failed, as it will fail in Omaha.

AN INSTANCE OF BELL ADVERTISING.

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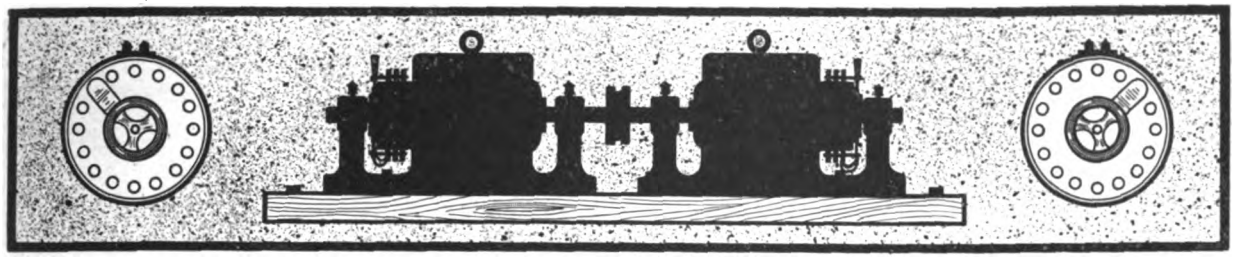

PROBLEM: THE AUTOMATIC VS. THE MANUAL TELEPHONE EXCHANGE.

Paper Presented at The International Electrical Congress at St. Louis,

By Kempster B. Miller.

THERE are two general methods of giving telephone service to a community: *First*—By what is commonly called the "Manual" systems, because of the fact that the switchboards employed at the central office require manual manipulation. *Second*—By the so-called "Automatic" systems, wherein the central office operator is dispensed with, switches being so arranged that they will, without the aid of human hands, perform the necessary act of connecting lines for conversation, and afterwards disconnecting them at the will of the subscribers.

In the manual system in its highest development, the telephone user has only to place his receiver to his ear to make his wants known, the desired connection being made at the central office by operators. This system may be assumed to be highly developed, as it has been almost universally used since the advent of telephony, a period of nearly thirty years. The manual system, in its present form, represents the consecutive work of a large number of men in a field of the most intense and constantly increasing activity, all these men striving for the best possible means of accomplishing a desired result.

In the automatic system, the central office switches are governed in their movements by the action of the subscribers or users who desire connections and subsequent disconnections. The subscriber does his own work, manipulating the apparatus before him in such a way as to cause the switches at the central office to select, connect with, and afterwards disconnect from, the line of the subscriber desired.

Unlike the manual system, the automatic cannot be assumed at the present time to have reached a relatively high development. While the automatic switchboard has been in the minds of inventors since the year 1879, it is not true that it has been put into considerable use until very recently. Instead, therefore, of its development being paramount in the minds of a large number of practical telephone workers, it has been fostered till lately by but few men, some of whom were unfamiliar broadly with the details of the telephone business. With a courage that must excite the admiration of all, a very few of these men have persisted, and, as a result, the telephone engineer, the operator of telephone companies, and last, but most important, the general public are confronted with what I think is the greatest problem that has been recently before the telephone world: The problem of the automatic vs. the manual switchboard.

A fundamental question affecting the entire problem is this: Is it possible to make a machine serve to effect the electrical connection of any line, in a large or small group, with any other line in the group, for the purpose of telephone communication, and afterwards to effect a disconnection when required? There can be, even at the present early stage of development, but one answer to the question. That it is. The automatic switchboard at Grand Rapids, Mich., recently selected for me 100 different lines chosen at random from among approximately 5,000 lines centering in that office. Some of the subscribers called did not respond, which will occur in any system, and some of the lines were automatically reported busy, which is to be expected; but in no single case was the wrong line chosen, and in but one case was the disconnection improperly secured. The verdict of a large number of the subscribers interviewed by me in that city is practically unanimous to the effect that they uniformly secure their connections and disconnections promptly, accurately and satisfactorily.

I conclude, then, in view of the present achievement, and of that future progress which this must stimulate men to make, that it is possible for the automatic switch to perform these functions satisfactorily.

If, then, the automatic switchboard may be made to accomplish the commonplace connection and disconnection of lines which form the great bulk of the work in a telephone exchange, is not the system so inflexible in its method of operation as to preclude the possibility of its performing the great multitude of special duties which, while not constituting the main bulk of the work, are nevertheless of constant occurrence and of hardly less importance? I refer to such matters as toll connections, private branch exchange work, and to a number of less important but nevertheless necessary classes of service.

A prominent telephone engineer has recently remarked to the effect that if some of the people enthusiastic on the subject of automatic switching in telephone exchanges were to visit the school for telephone operators maintained by the New York Telephone Company, they would be discouraged in their efforts, as no machine could ever be made to perform the many and varied functions that it was necessary to teach these young ladies before they became proficient telephone operators. This seems to be a statement that has very little to do with the real automatic problem. It should never be required that the machine shall do the same work that is required of the girl, nor do it in the same way. That is manifestly impossible, for no machine can ever be endowed with intelligence. (It may be that you will say that there are some telephone girls similary affected.) Since the very reason for the existence of the automatic exchange is to do away largely with the operator, it follows logically that whatever intelligence is to be applied to the making of the ordinary connection between two lines shall be that with which the subscriber desiring to make the connection is endowed. Here is a fundamental difference between the two systems, which must always lead to different modes of operation.

The real functions that the automatic switchboard should be required to do automatically, are those relating to the ordinary routine work of connecting and disconnecting subscribers' lines under the control of the calling subscriber. When some act needing intelligence at the central office is required, then let an operator supplement the work of the machine. To condemn

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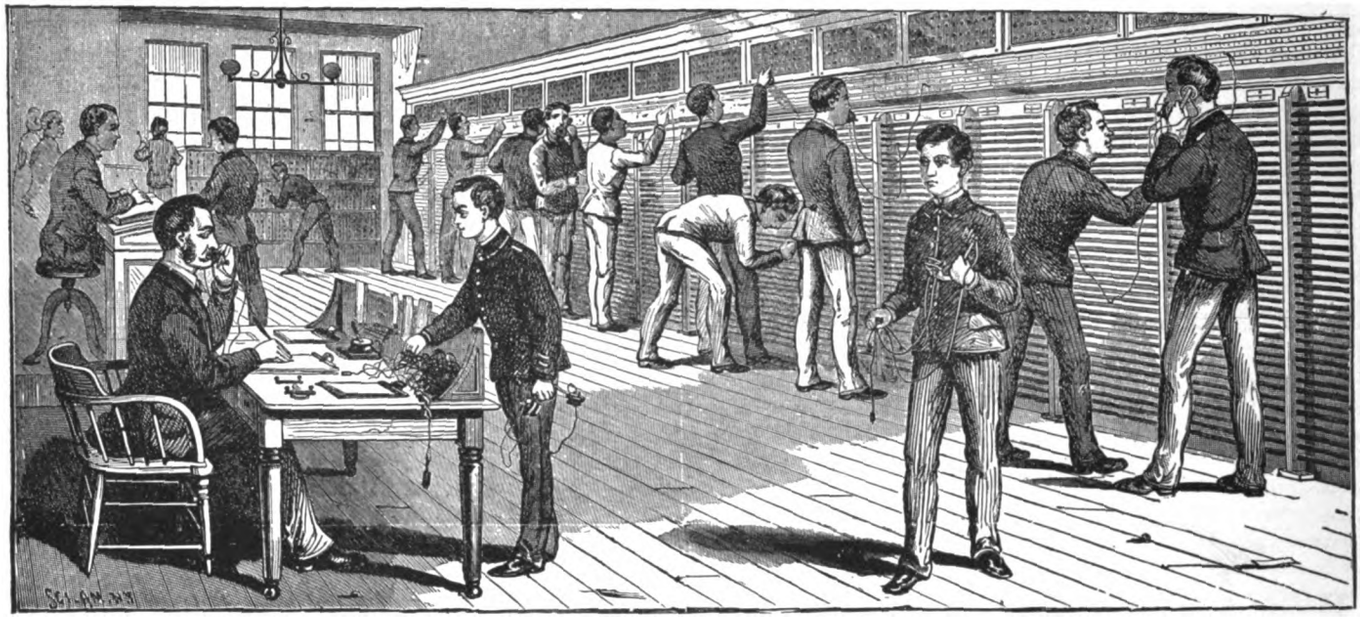

The Old Law Board at St. Louis, One of the Earliest Types of Switchboards.

the automatic switch because it will not perform all of the special requirements without the aid of human intelligence, is just as unfair as to condemn as valueless a Linotype machine because it cannot digest one of Steinmetz's equations. My mind has gradually changed upon this point until the doubt now exists as to whether the automatic system, widely supplemented by operators, is not even more flexible than the manual. It is the ease with which the personality of the operator may be introduced into the automatic system as a whole, and also the ease with which certain of the purely automatic functions may be varied by mere changes in the circuit, or in the mechanical relation of the parts, that makes this doubt exist.

Of course, there are many problems concerning traffic and service that are yet to be worked out for the automatic system, but apparently the longer one studies the automatic problem, the more nearly he becomes convinced that the automatic system is sufficiently flexible, with the interjection of human intelligence when necessary, to make possible the solution of practically all of the problems of service.

So far as I am aware, the selective signal party line working has never been accomplished commercially with automatic systems. I believe that the reason for this is solely the fact that automatic telephony is yet new. I have recently seen a plan whereby any ordinary number of stations can be selectively operated on a party line with practically no other added complication either at the central office or at the subscribers' stations than that which is added to the apparatus of an individual line manual system to adapt it to the same class of party line work. The solution of the automatic party line problem, while not yet reached to the extent of being actually introduced into commercial use, is entirely possible and the party line matter will not be one of the controlling factors in the solution of the problem: Automatic vs. manual.

Having seen that the thing is possible, that it seems from a technical standpoint to be able to do what is wanted, another question is: Do the subscribers like it?

The evidence all seems to point in one direction. They do. At Grand Rapids, Mich., ninety-five per cent. of a large number of subscribers interviewed by me liked it better than common battery manual service; four per cent. did not care much one way or the other, and one per cent. liked the manual system better. At Fall River, Mass., where the system has been in use for a much longer period, the verdict was quite the same in effect. Evidence from other cities where automatic service is being tried seems to agree. It must be said in fairness, however, that at Grand Rapids the mass of subscribers is leavened by the presence of a large number of stockholders in the local company. Again, there is in that city much civic pride in the system. Telephone people come from all parts of the country to inspect the plant. Still again, the delight of the subscribers may be similar to that of a child with a new toy, but this can hardly be true, because of the fact that the exchange at Grand Rapids has been in service for a period of nearly nine months, and is carrying a very large business load, so that if the people were not actually getting satisfaction they would possibly know it. The new toy idea is apparently disproven by the condition at Fall River and New Bedford, where the service has been maintained for several years, and seems to be much liked.

The question also naturally arises: Is not the automatic switchboard and necessary subscribers' mechanism too complex to be maintained in proper working order without undue cost? It is perhaps too early to decide this question. There is not enough evidence one way or the other. Judging from the past, however, the tendency of the industrial achievement seems to be to do things automatically. As examples, take the arts of printing, of weaving, and the use of automatic machine tools.

Summing up, therefore, the statements already made, the automatic system is not only a possibility, but is actually here. With the interjection of human intelligence to supplement it in performing certain functions, it seems to be as flexible as the manual. Party line, common battery, and measured service working, while not yet achieved commercially, so far as I am aware, seem to be well within the grasp of those who are doing the development work. The public seems to like it, and we do not know whether it is too complex or not.

It will be noted from the foregoing that the idea of having the central office apparatus perform *all* the phases of telephone service is apparently not tenable. Many of those who have advocated it in the past have abandoned it, and are introducing human aid in the performance of some of the functions. This being true, a certain number of operators will be, and are, needed in automatic exchanges. This tends to destroy in some degree the primary object of the automatic system—the doing away with operators. We have seen many papers bearing on each side of this question, to the effect that the salaries of the operators were or were not to be eliminated; that retiring rooms, matrons, operators' luncheons, etc., were or were not to be done away with. These items of expense will probably exist to some degree in all large automatic exchanges. That they will be greatly reduced is without question, but whether or not they are reduced to such an extent as to offset other sources of expense introduced by the employment of automatic apparatus is a problem yet to be solved.

What are some of these sources of expense that tend to offset

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the reduction in operators' salaries and expenses coincident therewith? Taking the system as a whole, we find that the present automatic system is considerably higher in first cost than the manual system, and assuming that interest and depreciation are at the same rate in each case, this shows to considerable disadvantage against the automatic system in the annual charges due to these items alone.

For an exchange of 5,000 lines served to one office, the cost of automatic equipment, including telephones, may be taken at $35 for each individual line. In manually operated exchanges the corresponding cost is not far from $25 per line. The difference becomes greater—that is, more in favor of manual—for smaller offices, and smaller or less favorable to the manual in larger offices.

Whether or not the depreciation on automatic apparatus should be taken at a higher rate than that on the manual, is a question that we have not at present sufficient data or information to determine. It is true that in the automatic switchboard the flexible cord nuisance found in all present form of manual switchboard apparatus is largely eliminated. It is also true that the automatic apparatus is more complicated, and requires greater care in its maintenance; but whether, if both systems are maintained with reasonable care, the automatic will show a much greater rate of depreciation than the manual I am not at all certain. Much of the depreciation in manual telephone apparatus is due not to the fact that the apparatus wears out, but rather to the fact that the apparatus is rendered obsolete by new inventions. That the same will be true in the case of automatic apparatus cannot be doubted, but it is a good point to bear in mind that if telephonic development should point toward automatic apparatus to the exclusion of manual, and should prove the superiority of automatic, then the highest developed and newest manual apparatus will depreciate greatly in value by that fact alone. It does not seem unreasonable, therefore, to place the rate of depreciation on both manual and automatic apparatus at about the same figure.

In point of maintenance the advantage must be conceded to the manual. This is certainly true at present with regard to both the central office and the subscribers' station apparatus. No good reason is apparent why it should not always be true. Automatic apparatus is especially at a disadvantage at the subscribers' stations, and it is really at this point that the automatic system seems to involve a poor engineering feature. The tendency of telephone development in regard to substation apparatus has been until lately along what seemed to be unquestionably good engineering lines. The substation apparatus has been gradually simplified, the battery has been removed, as has also the magneto generator, and the instrument has been reduced to the simplest fundamental parts.

Automatic telephony as at present developed for large work takes a step backwards by reintroducing the local battery. That this is disadvantageous no one can deny, but on the other hand it must be pointed out that the disadvantage is by no means as great as it would have been several years ago because of the fact that dry batteries have recently come into almost universal use for this kind of work and are far superior, all things considered, to anything heretofore available.

The disadvantage of local batteries, while mitigated, is still present, and is real; but, taking the automatic system, as we have reason to believe it will exist in the future, with no local batteries, it will still possess, as far as we are able to see, a more or less complicated impulse transmitting device, by means of which the subscriber will be able to direct the movements of the switches at the central office. Complexity not only of mechanism, but of function, is thus introduced at the subscriber's instrument, and this seems to be an inherent disadvantage to all present schemes of automatic exchange working. This, of course, is another factor that must be weighed in considering the relative economies of the two proposed methods.

There is a point that I have not yet seen mentioned in print which, under certain cases, seems to be of great importance. This is the matter of trunking between two or more automatic offices in such cities or communities as naturally demand, by the distribution of their subscribers, more than one office. It is true that the present automatic switchboard seems to be capable of properly handling this condition if the requisite number of trunk lines between the offices are provided. At first thought it seems that the number of trunks required between offices for a given amount of traffic might be somewhat less in the case of the automatic than in the case of the manual system, on account of the immediate disconnection and release of the trunks, in the automatic, upon the hanging up of the receiver of the calling subscriber. Further consideration, however, will show that there is very little difference in the time the trunk is held busy in the two systems, the length of actual conversation being assumed to be the same in each case. The reason for this is that, while the automatic gains in this respect in the release, it loses something in the making of the connection, because in the case of the automatic, the trunk is selected with the first movement of the dial by the subscriber, and the length of time that the trunk is held busy, therefore, must include the time during which the subscriber is setting up his own connection; whereas, in manual boards, a trunk line begins to be busy at the time when the *B* operator picks up the incoming trunk plug and designates its number to the *A* operator.

So far there seems to be little difference between the systems in this respect.

The bearing on the trunking problems of the relative efficiencies of different sized groups of trunks between offices does not, however, seem to have been considered by many in considering the question of automatic vs. manual exchanges. When sufficient trunks are provided between offices to handle business on the so-called "no delay" basis, it is known that a large group of trunks will handle very much more business per trunk line than a small group. For instance, when there are only ten trunks in a group between offices, it is a well-established fact that slightly less than eighty calls per trunk per day may be handled. If, however, the group is increased to 100 trunks, as many as 145 calls per trunk per day may be handled. This is an increase of considerably over eighty per cent. in actual trunk efficiency. In the present automatic system, group the trunks as you may, it is inherently true that the efficiency of trunks is reduced to that of a group of ten. I do not mean by this that it is not possible to place as many trunks as desired between any two offices, but that any subscriber has access to ten trunks only in order to secure a connection to any other office. It is true that some other subscriber may have access to another ten, or to the same ten, but no one subscriber can reach more than ten. This seems to be a grave objection to the use of automatic systems as at present developed, in those communities where several offices must be employed and where traffic is such as to demand a large number of trunks between offices. The remedy to this is obviously that of giving the subscriber the chance to select his trunks from larger groups. This, I take it, is one of the problems that need serious consideration in adapting the automatic system to very large communities. It does not enter seriously in single office work.

In all that I have said I have attempted to take the very practical view of the engineer, and fundamentally that view must always compare systems with the intent of selecting a means of doing what is required well enough for the smallest price. From the strictly engineering view one does not take into account relative popularities of mere ways of accomplishing results. But this is necessary in such a case as this, for there are features of the automatic system which may make it so popular as to force upon the owners or prospective owners of telephone industries a serious consideration of the doctrine of expediency. This is by no means the least of the important things to consider.

I expect to be criticized because I have not solved the problem. It cannot now be solved any more than the question of alternating versus direct-current transmission could be decided when we first were brought to realize that there was an alternating versus direct-current transmission problem. My object has been to state the problem as I see it, and I hope that in doing this something may have been accomplished toward clarifying it.

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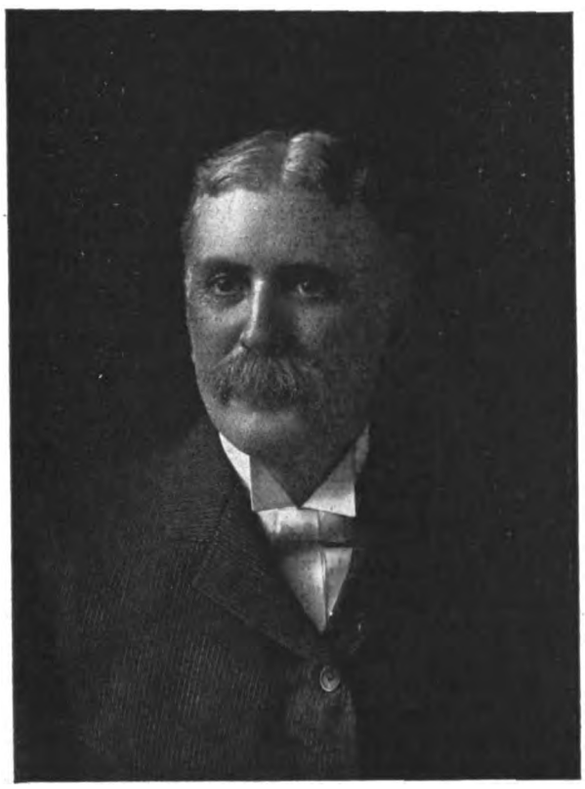
IN THE OPERATING FIELD.

THE NATIONAL INDEPENDENT TELEPHONE CONVENTION.

THE National Independent Telephone Association will hold its annual convention at St. Louis on September 21, 22, 23, and 24. The headquarters will be at the Inside Inn, situated on the World's Fair grounds. Addresses will be made by men of national reputation, and special entertainment features



Hugh J. Doherty, President of the National Telephone Association.

have been arranged for the pleasure of the delegates and their friends. Reduced rates on all railroads have been secured so as to allow of as large a number of Independent telephone men to attend as possible.

BELL TACTICS AT LOGANSPORT.

THE people of Logansport, Ind., are experiencing many similar tactics to those employed by the Bell at Evansville. A franchise ordinance has been prepared by the Bell company to be submitted to the common council, but so far no definite details of its purpose have been made public. Councilmen have been approached and urged to support it, and the usual tactics with regard to lobbying have been worked vigorously. It was expected that the franchise would be submitted at the last meeting, but evidently the Bell company was afraid of the moral effect the large attendance would have had upon the councilmen, and it was side-tracked till the next meeting. Those of the councilmen who have been approached state that the franchise is a very broad one. The city records show that a well-guarded long-distance franchise was granted to the Bell company some time ago, but it was refused. Now the matter is to come before the council with the intention that the restrictions to long-distance business be stricken out and local rights granted.

The strange feature is that the Bell people who deserve the franchise do not come out in the open, so that the public can see what it is and what it means, but in keeping with its usual methods, it hopes to gain its point by stealth. In this instance the public will be on hand to see that the ordinance is not railroaded through the council.

CONVENTION OF MUNICIPAL ELECTRICIANS.

THE ninth annual convention of the International Association of Municipal Electricians was held at the Grand View Fraternal Hotel, St. Louis, this week. The opening session was held at 9.30 A. M., Tuesday, September 13th, in the meeting room of the hotel. The following papers were announced for discussion: "Method of Testing," by Walter M. Petty, of Rutherfor, N. J.; "Street Lighting," by A. S. Hatch, of Detroit, Mich.; and "The Limitations of the Telephone for Fire Alarm Purposes," by Adam Bosch, of Newark, N. J.

MEETINGS OF DISTRICTS NOS. 7 AND 9, OHIO INDEPENDENT TELEPHONE ASSOCIATION.

AT the meeting of the Seventh District of the Ohio Independent Telephone Association, held at Lima, on the eighteenth of August, twenty-four cities and towns of the district were represented and representatives of the State Association were also present. The district comprises the counties of Marion, Wyandot, Hancock, Putnam, Paulding, Van Wert, Mercer, Allen Auglaize and Hardin. George H. Metheney, of Lima, was elected president, and D. A. Clark, of St. Marys, secretary. An executive committee, consisting of one member from each county in the district, was also appointed.

F. L. Beam, of Columbus, president of the State Association, was present and stated the objects of the association to be for the mutual protection and general advancement of the interests of the Independent telephone business of the State. Mr. J. B. Hoge, vice-president of the United States Telephone Company, was present and gave some interesting and valuable information concerning the relative Bell and Independent interests in the State from a physical standpoint, comparing the wonderful growth and development of the Independent movement, with the doless and almost inactive policy of the Bell. Mr. M. B. Overly, general manager of the United States, also spoke on the same lines and promised still better service from his company.

The meeting was a very successful one, and the general feeling was that a strong State and district organization should be perfected and the Independent interests placed on a firmer and more aggressive basis than ever.

District No. 9 held its first meeting at Columbus on August 23. This district embraces twelve of the most important counties in the State and an effort was made to interest persons financially interested in the telephone business as well as the managers. The effort was successful beyond expectation, and was attended by representative banking, professional and business men of the several counties in the district. The utmost enthusiasm prevailed, and the plan of organization proposed met with unqualified indorsement and acceptance.

The plan as accepted involves the appointment of an auxiliary committee, appointed by the vice-president of the district, made

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PROCEEDINGS OF THE INTERNATIONAL ELECTRICAL CONGRESS AT THE WORLD'S FAIR, ST. LOUIS.

At the International Electrical Congress, held at St. Louis this week, there were gathered together delegates representing every branch of electrical industry from Great Britain, Italy, France, Germany, Spain, Sweden, Norway, Brazil, Argentine Republic, South Africa, Australia, the United States, and several other countries. At the opening session the nominations of the organization committee for officers were ratified. Professor Elihu Thompson, past president of the American Institute of Electrical Engineers, was chosen president of the body. Dr. A. E. Kennelly, of Harvard University, was elected general secretary, and W. D. Weaver, of New York, treasurer. The vice-presidents include Prof. H. S. Carsart, of Ann Arbor, Mich.; C. F. Scott, of Pittsburg, and Prof. S. W. Stratton, of the United States Bureau of Standards. Honorary vice-presidents were elected as follouss Prof. Moise Ascoli, Italy; Col. R. E. Crompton and Dr. Glazebrook, England; Antonio Gonzales, Spain; R. Kaye Gray, president of the British Institute of Electrical Engineers; Prof. L. Lombardt, Italy; Prof. John Perry, England, and Prof. Henri Poincare, France.

After routine business had been carried out President Elihu Thompson delivered a short address welcoming the foreign delegates to the United States.

The allotment of the delegates to their respective sections was then carried out, after which the general session adjourned to meet again Saturday morning for the closing exercises.

The section on "Electrical Communications" was presided over by Mr. F. W. Jones, of New York, with Mr. B. Gherardi, of Brooklyn, as secretary. This section covered all matters on telephone and telegraphy. In this issue part of the papers presented in this section are published. The other papers in this section of interest to the telephone industry will be printed in our issue of next week.

up of active persons in each of the twelve counties, to act in conjunction with the vice-president and to secure accurate and reliable data as to the situation telephonically in each county.

Telephone companies controlling over 27,650 telephones and representing an investment of $3,530,000 were represented, and the substantial result of the meeting was to bring these different companies into more intimate relations, to provide plans, the result of which will be unanimity of action on their part and the establishment in a pratical and businesslike way of an actual community of interest among them.

The meeting was presided over by the undersigned and interesting addresses were made by the Hon. Cyrus Huling, president of the Columbus Savings & Trust Company; J. C. Reber, cashier of the Winters National Bank, of Dayton; Frank L. Beam, president of the Ohio Independent Telephone Association, and by many other persons of equal prominence.

The names of the members of the auxiliary committee, above mentioned, and the counties from which appointed, are as follows: The Hon. L. P. Ohliger and J. R. Zimmerman, for Wayne County; the Hon. George Adams and M. M. Heron, for Holmes County; H. C. Devin, Esq., for Knox County; Wm. M. Heseltine, for Delaware County; Howard Schwarz, for Ashland County; S. E. Ward, for Richland; Sol M. Wolf, for Crawford County; W. H. Fledderjohann and F. L. Van Gorden, of Hocking County; Ralph Reamer, for Franklin County; Amai W. Whitney, for Morrow County, and Noah Yenrick, for Fairfield County; Harry P. Sinsher and Chas. E. Hallender, for Licking County.

AN OPEN LETTER TO THE PEOPLE OF PEKIN, ILL.

THE management of the Home Telephone Company of Pekin, Ill., has issued an open letter to the general public setting forth the advantages of the Independent system. In part it is as follows:

"A Pekin company for Pekin people—get this fact clearly in your mind. This is a Pekin corporation. Its stockholders are your friends and acquaintances. Its bonds are held by your own friends, and its officers and employees are your neighbors. If it pays money for interest, or wages, or profits, that money, every dollar of it, stays here to be used again and again to the direct benefit of our own city. Is not your loyalty due in a peculiar way to an institution such as this when brought into competition with a corporation founded in Boston, owned in Boston and managed wholly for the benefit of Boston? Our new directory will be ready for distribution September 1, 1904.

"Remember that by January 1, 1905, we will be connected with the Independent telephone exchange at Peoria, with more than 3,000 subscribers. Your own city, with more than 960 subscribers, ought to be a guarantee of the efficiency of our service.

"Why have a telephone in an exchange with less than 200 city subscribers when you can get one for less money in an exchange with more than 900?"

PEORIA INDEPENDENT COMPANY HAS NOT SOLD OUT TO THE BELL.

A RECENT newspaper report from Peoria, Ill., stating that the Independent company had sold out to the Bell, is entirely without foundation. The Independent company has a costly underground system there, and recently the Bell people in laying conduit crossed the former in several places. Bids for the new exchange of the Independent company were recently all rejected because of some insufficiency in the plans. These facts may have given rise to the story.

PICNIC OF STROMBERG-CARLSON EMPLOYEES.

THE first annual picnic of the employees of the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., was recently held at Sea Breeze. Nearly 1,000 of the employees of this large industry participated.

Preparations for the event were in the hands of capable committees and when the picnickers arrived at the lakeside they found entertainment mapped out for them from the start.

At 10.30 A. M. there was a ball game between married men, captained by Mr. Chamberlain, and single men, captained by Mr. Rice.

During the afternoon athletic games were held and also dancing, and a cake-walk in the evening.

The cars which conveyed the picknickers to the lake were decorated with streamers. Myers's band furnished music. Coffee and lemonade were served at the pavilion and dinner was served at the hotels.

Following are the committees that were in charge of the outing:

Committee chairmen—Advertising, W. Radford; athletics, W. M. Angle; badges, Miss Dillon; prizes, W. Peachy; transportation, H. L. Rice; refreshments, C. A. Hughes; press, Charles C. Bates, dancing, J. T. McGuire.

Executive—P. V. Mahon, T. Tanswell, S. Kendall, B. Mouatt, N. O. Tassell, W. E. Russell.

Finance—W. W. Hawkins, W. Frisbie, A. J. Mahon, W. Parker.

Reception—E. H. Satterlee, C. E. Angle, L. B. Somerby, A. Stromberg, A. Carlson, W. W. Hawkins, A. J. Mahon, T. W. Finucane, M. S. Conner, W. J. Frisbie.

Dancing—Mae Cooney, May Maddocks, Julia McCall, Gerald Cox, Louise Schrieber, Sherman Thomas, Martin Gagie.

Refreshments—J. Finkle, Martin Gagie, M. J. Guinan.

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TELEGRAPHY AND TELEPHONY IN JAPAN

Paper Presented at The International Electrical Congress at St. Louis.

By Saitaro Oi.

電報 話筒

TELEGRAPHY, as in all other countries, is also the oldest and was the first practical application of electricity in Japan. It is generally believed that Commodore Perry of the United States, when he came over to Japan in 1854, brought two sets of telegraph instruments with him and presented them to the Shogun (at that time the Lieutenant General, or Governor General, of the Empire). The first telegraph line, however, was constructed between Tokyo and Yokohama in 1869, the instruments used being Bréguet's instruments, which were employed for some time until all were superseded by Morse inkwriters. There was not very much progress until 1877, when the civil war broke out in the southern districts; this naturally necessitated an increased use of the telegraph and the lines were extended to the important places of the Empire. These 36 years from 1869 to 1904, have wrought a remarkable change in our social conditions in general, and in the domain of means of communications for the public some progress has been made.

There are a good many private telegraph and telephone lines worked exclusively for railway and for various other industrial purposes, which, according to the latest report, amount to the remarkable figures shown below:

	Miles of wire.	Number of instruments.
Telegraph	10,892	1,340
Telephone	10,635	5,381

The first telegraph line in this country was constructed by some English engineers and linemen in the service of the Japanese government. The chief engineer was Mr. E. Gilbert, who had been connected with a railway company in Scotland before he came to Japan, and as may be imagined, the method of surveying, construction and maintenance of the land lines laid out by him was naturally after the English practice, and is continued, with more or less changes, down to the present day. The lines are built in a solid manner, so that they can withstand the attacks of storms, which are almost certain to come once or twice in autumn every year.

As to the telephone lines in towns, the method of construction may be said to follow American rather than English practice, and in some places where no cables are employed, as many as 100 to 150 wires are run upon a pole planted along the side of the streets. In large towns, however, these crowded overhead wires are generally being taken down and laid underground, and as will be seen from the table I give later on, there are at present some miles of underground lines.

Poles are generally of cedar, which grows in abundant quantity in different parts of the country. The number of main poles used varies, of course, with the number of wires put up, the nature of the route through which the lines pass, etc.; but in the open country there are, as a rule, from 38 to 26 per mile; and where there are too many wires for one pole to carry, trussed poles—often H poles—are employed. Ordinary main poles are of 22 to 24 feet. Taking the average, 64 per cent. of the main poles are stayed, while 14 per cent. are strutted. Boucherizing is a common practice as a means of preservation of the poles, but lately creosoting is being tried though on a small scale.

Boucherized poles last about 18 years on an average, whilst untreated poles begin to decay within 5 or 6 years; and owing to the fact that the price of timber, which was fabulously cheap in the earlier days of telegraphy, has become somewhat expensive with the recent progress of engineering work in general, various compounds and methods of preserving wood have naturally had the attention of the engineers concerned. Considering, however, the different conditions of this country, the most suitable one for telegraph and telephone purposes seems, so far, to be the boucherizing process. Forty-six per cent. of the poles are boucherized, the remaining untreated.

Arms with double-cup porcelain insulators are exclusively used and are always fixed on that side of the pole facing the so-called up-station. For telegraph lines, two-wire arms of 24 inches and 34 inches are generally used except where many wires are to be run. They are secured to the poles a foot apart, and alternately in case more than two wires have to be put up.

Telephone wires are run on 4, 6 or 8-wire arms most commonly, and long-distance lines on braced 6-wire arms. The distance between the centers of the arms is 1 foot 6 inches, the minimum distance allowed from the ground to the lowest arm being 16 ft. The span of the long-distance lines is usually 48 yards, the minimum transposition being done at every twentieth pole.

For telephone lines in towns where there is not much snow we use No. 17 S.W.G. hard drawn copper wire, and silicon bronze wires, but in the northern districts where snowfall is abundant during the winter, No. 14 iron wire is run for subscriber's line. For the interurban telephone service three gauges of copper wires —No. 8 S.W.G., No. 12 S.W.G. and No. 14 S.W.G.—are employed.

Fig. 1. Telephone line in Japan.

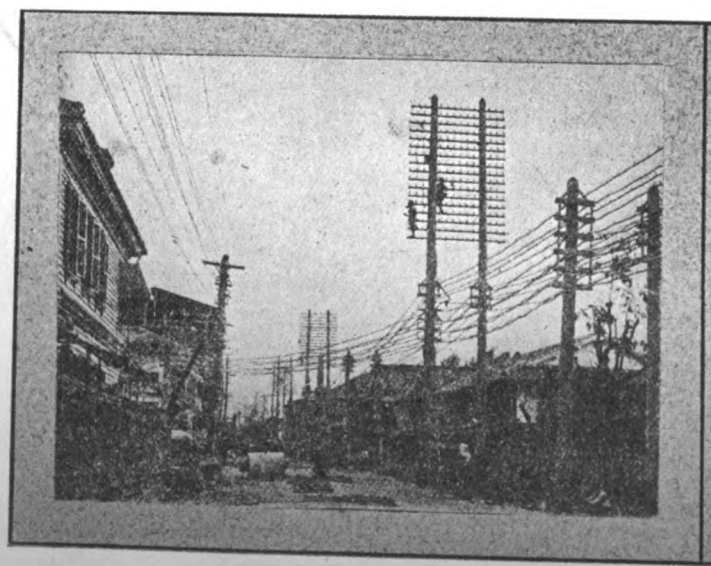
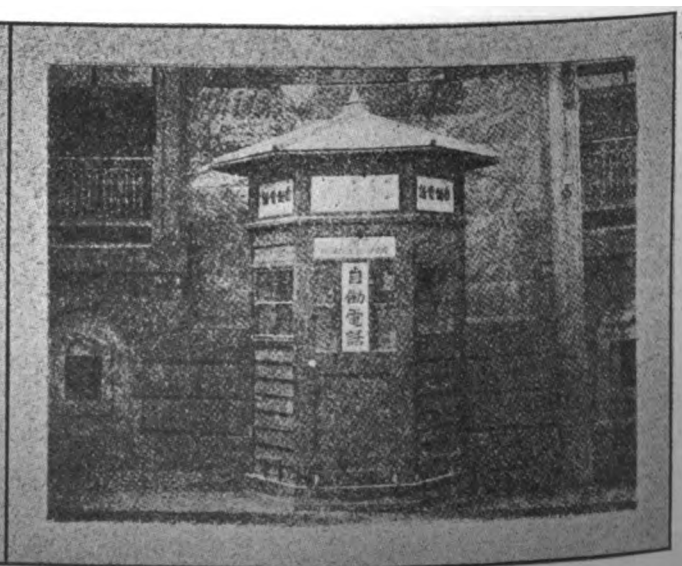


Fig. 2. Street Telephone Booth in Japan.



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For long spans such as river crossings, steel is almost always used in the case of telegraph lines, and bimetallic wire for telephone circuits of long distance. We had many long spans when railways were few, but at present we have our telegraph lines at river crossings, attached to rialway bridges, or cables are laid on the girders in a trough. The longest air span now in existence is 800 yards with steel wire, and 320 yards with bimetallic wires, each of 170 lbs. per mile. Fig. 1 is a general view of a telephone line in a town.

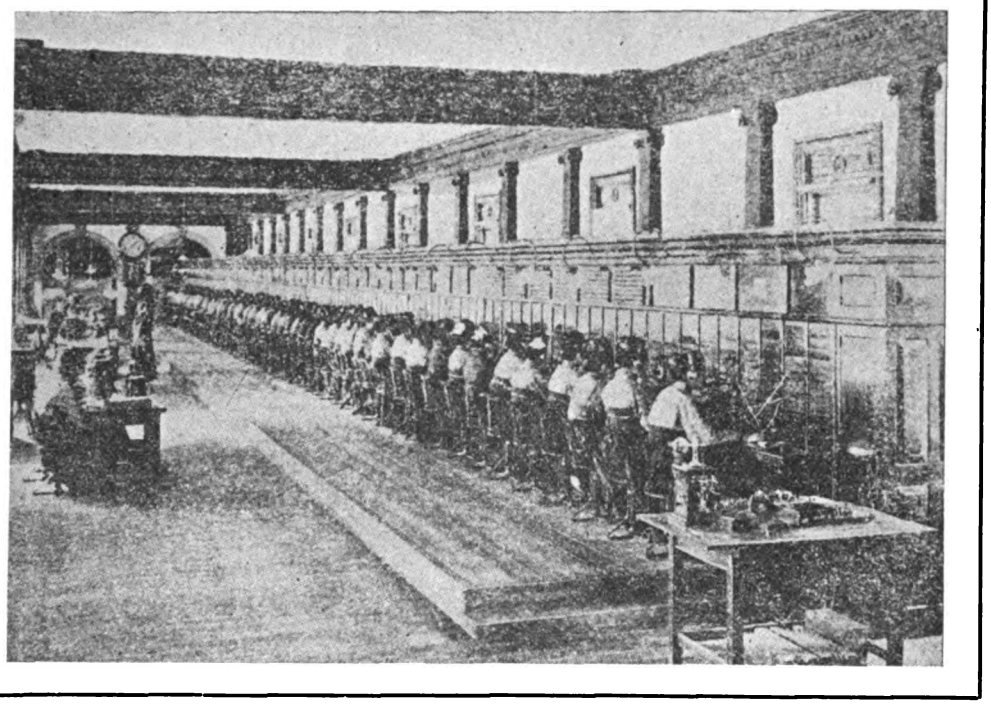

Fig. 3. Exchange at Tokyo.

When the first underground construction was undertaken in Tokyo in 1896, we adopted 3 in. cast-iron pipes and the same system was employed, to a considerable extent, in the other towns also; but my visit to the United States in 1898 gave me a favorable impression as to vitrified clay conduit, and immediately after my return home, I advised the authorities to adopt it where we have more than three ducts. Since then the single-duct vitrified clay conduit has become the standard of underground working, as our manufacturers can make it excellently and cheaply.

The telephone cable for underground work is of the dry-core paper insulation, and in large towns apparatus for sending compressed dry air from 3 to 4 atmospheres into the cable are provided for. This proves very useful in Japan as the cables are all imported, and in case cables should get low in insulation we can easily repair them. 100-pair cable was used when the underground work was commenced, but now, 200-pair cable is very common, No. 20 S.W.G. being the size of the conductors. Smaller wire cable has been suggested for some uses, but it has not yet come into actual use. Most of the lines in towns being overhead, we have naturally a great many aerial cables, both of India rubber and dry-core type, put up on poles to avoid too many telephone wires crowded together, or to cross electric light and power conductors, which are also carried along the streets like the telegraph and the telephone lines.

The telephone was first brought to Japan in 1877 by a mechanic returning home from America, and was a magneto telephone encased in a box. Soon after its introduction, the telephone was put into practical use as an auxiliary to the police service in Osaka and vicinity, a considerable length of lines being built for that purpose. Some of the circuits then constructed were more than 30 miles in length and as many as ten such magneto instruments were connected in series on a single circuit of iron wire. As can be readily understood, conversation was no easy task unless by those who had experience in using the instrument. After the introduction of the carbon microphone the application of the telephone for industrial and commercial purposes began to increase remarkably, and it was in 1883 that the idea of starting telephone exchanges first occurred to the authorities. A company was promoted for carrying on the business and a petition was forwarded to the Government asking for a license to start an exchange and carry on the telephone business in Tokyo. That was in 1884. The question whether it should be carried out as a Government undertaking or entrusted to a private capital remained unsettled until 1889, when it was decided, after deliberation, to undertake the work as a state monopoly.

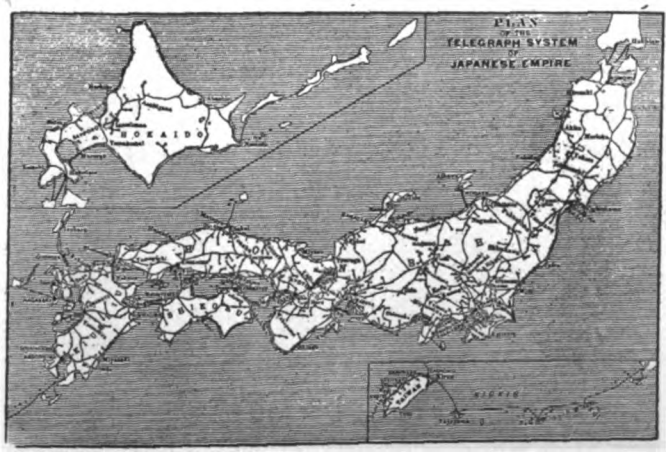

Fig. 4.

While the matter was still in consideration by the Administration, it was thought necessary that our engineers should get more detailed information for the successful working of telephone exchanges. The writer was appointed to make a tour of Europe and America to study telephone matters. My stay in Europe and America lasted a year and a half, and it was in December, 1889, that I returned home from my first trip abroad. At that time an appropriation for the telephone undertaking had already been made, and the work was to be started as soon as possible in Tokyo and Yokohama. The executive office was opened in Tokyo, and letters and circulars were sent out to business men, to the nobility, to Government officials, to manufacturers and, in fact, to any person in the city of more or less prominence. We advertised in the popular papers the opening of telephone exchanges and invited subscriptions from the general public. We did not confine ourselves to letters and circulars or to the newspapers alone, in introducing the telephone to the public, but, in addition, we put up a switchboard and telephones in the building of the Tokyo Chamber of Commerce, and in the Rice and in the Stock Exchanges, and invited people of various occupations to try the instruments in order to be convinced of the practical utility of the telephone. In Yokohama the writer gave a popular lecture to convey to the public an idea of the commercial and

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social uses of the telephone. In fact, we spared no pains to secure a satisfactory result in the new enterprise, but notwithstanding such efforts on our part, we got only about 70 contracts in Tokyo and 20 in Yokohama when we commenced the construction of the lines. The service was started in Tokyo and Yokohama in December of 1890, the number of subscribers at that time being about 200 in Tokyo and 40 in Yokohama. However, the actual opening of the exchanges and establishment of communication between the subscribers spoke far more eloquently to the public than any letters, newspapers or lectures, and before long our facilities were far behind the demand. The growth of the telephone exchange business since 1890 may be seen from the following table:

GROWTH OF TELEPHONE SERVICE.

Year.	Number of telephone exchanges.	Number of telephone substations.	Miles of subscribers' lines (pole).	Miles of wires.	Miles of overhead cables.	Miles of underground cables.	Nautical miles of submarine cables.	Miles of toll lines.	Miles of toll wires.
1890	2	359	100	669	....	.....	....	22	139
1895	4	2,913	388	4,826	1	.....	....	46	410
1900	25	19,203	1,332	29,287	117	78	4	598	5,309
1903	46	36,700	1,669	40,593	198	173	4	901	7,571

The increase of traffic necessitated putting up more toll circuits, and some 100 miles of new line with about 1,600 miles more wire are now under construction. On completion of the line, Tokyo and Nagasaki, which cities are 800 miles apart, will probably be put in direct communication.

When the exchanges were started in Tokyo and Yokohama, single circuits of No. 18 S.W.G. hard-drawn copper wire were arranged for subscribers' lines, the 100-wire standard switchboards of the Western Electric type and a modified form of the Gower-Bell telephone set with a battery for calling, were employed, the toll lines between the two towns being metallic circuits of No. 12 S.W.G. copper wires. No. 18 copper wires were afterwards changed to No. 17, which is now the standard size of wire for subscribers' lines, except in the northern snowy districts; and the modified Gower-Bell set with calling battery, has been changed to the solid back or Delville set with a magneto.

Small exchanges not having upwards of 600 subscribers are operated with the 100-wire standard switchboard, and for exchanges where more than 600 subscribers are to be connected, multiple switchboards are generally used. At present Tokyo has five exchanges, the largest of which contains 4,000 subscribers and the smallest 1,500, and each exchange is equipped with bridging multiple switchboards. In Osaka there are two exchanges, both of which are also fitted with bridging magneto multiples, having an ultimate capacity of 6,300. Reverse trunking is used between different exchanges in a town and also on short toll lines. Yokohama, Kobe and Nagasaki are also worked with bridging magneto multiples, these towns having only one exchange in each. Kyoto, our ancient capital, was worked with the old series-multiple switchboards, but an alteration to the relay switchboards, manufactured by the Western Electric Co., was effected in May last year, and since then the system is working satisfactorily. Kyoto has no branch exchanges; it has an ultimate capacity of 6,300 and the preesnt equipment 3,000. The series-multiple switchboards are still in use at Nagoya. All other exchanges are being operated with the 100-wire standard switchboards, but some of them experience inconvenience at times in working, due to increase of subscribers, and we anticipate supplying them with multiple switchboards. Fig. 3 shows the interior of the exchange in Tokyo.

A subscriber's set is furnished with either the solid-back or the Delville transmitter and always equipped with an arrester. A desk set, artistically designed, is liked by some people and supplied, if required, upon an extra payment of 6 yen per annum. Where the C. B. system is employed, the same type as the post-office wall set is in use, the transmitter being the solid back. Fuller's bichromate battery for the solid back, and the Leclanché for the Delville are generally used.

The automatic telephone, which has come into use since 1899 is somewhat like the Grey instrument, and so constructed that the operator is enabled to distinguish the kinds of coin put into the slot by hearing different sounds made by the coin in its sliding down along each chute. Fig. 2 shows a view of an automatic call box in the street of Tokyo.

No party lines are in existence at present, except a few telephone call office circuits in small villages. This system, however, has been often considered, with a view to meeting the pressing demand of the public for the telephone, but so far it has not come into use.

The actual number of toll line circuits amounts to about 100. In addition to that number 22 telephone circuits are formed by utilizing the telegraph lines for simultaneous transmission, and 20 by duplex telephony or virtual circuit. Simultaneous transmission of telegraph and telephone was first experimented in 1884 after the Van Rysselberghe system between Tokyo and Yokohama, but the experiment was not made with sufficient care and it ended in failure. The second experiment was conducted rather more carefully in 1886 by using the telegraph wires crossed and it resulted in a success.

In order to give an idea of the present situation of our telephone exchanges, I give the following figures for the seven towns where the exchanges are worked with multiple switchboards:

MULTIPLE SWITCHBOARD EXCHANGES.

Name of town.	Number of subscribers.	Number of subscribers not yet connected.	Public call offices. Ordinary.	Public call offices. Automatic.	Population.
Tokyo	14,192	8,019	46	68	1,640,000
Osaka	6,481	3,608	28	10	930,000
Kyoto	2,413	3,303	13	9	380,000
Yokohama	1,464	517	22	14	300,000
Kobe	1,437	1,152	16	9	260,000
Nagoya	1,327	1,023	7	6	270,000
Nagasaki	742	359	4	1	140,000

When the telephone exchanges were started in Tokyo and Yokohama in 1890, all the lines connecting the two towns were specially constructed with copper wire transposed at intervals as a precaution against disturbance from external causes, and there did not exist much necessity to have recourse to the telegraph lines. In 1894 duplex telephone circuits were tried between Osaka and Kobe, which are 23 miles apart, and were worked quite successfully. In order to actuate the indicators on the duplex circuit, the neutral points of the repeating coils were earthed, and by using the circuit so formed by earthing, direct signal current was sent so as not to cause disturbance to the conversation. The telephone lines between Tokyo and Osaka were opened to the public use in 1896. Combining these lines, which are 377 miles in length, duplex telephony was successfully applied.

In course of time telephone exchanges were gradually opened in various provincial towns, which has enhanced the popularity of the telephone to a great extent and petitions for telephone facilities came in to the hands of the authorities from various quarters. This brought up the necessity of opening telephone call offices first in those places which did not possess telephones, and to save money, existing telegraph lines were used. At present some 1,000 miles of telegraph wires are worked simultaneously for the telephone. Fig. 4 shows the toll line system in Japan at the present moment.

The flat rate system is adopted in all towns. The charges are as follows:

Tokyo and Osaka.....66 yen per annum.
Yokohama, Kobe, Kyoto, and Nagoya..54 yen per annum.
Other smaller towns.....48 yen per annum.

These are for subscribers located within the town limits. Those living in the vicinity beyond the town limits, but within a certain telephone area specified by the government, can be connected to the exchange by a payment of 10 yen per 120 yards or under, for construction of a line beyond the city limits; and a payment of 2 yen per annum per 120 yards or under beyond the city limits as additional subscription.

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Interurban lines are charged for according to the distance and for a conversation not exceeding 5 minutes. The basis of the toll rate is approximately as follows:

Up to 5 ri (one ri is nearly 2.5 miles)	20 sen.
Up to 25 ri	25 sen.
For each ri beyond 25 ri	1 sen.

In a small provincial town or in a village specified by the government, and which is connected by a toll line to any other town having an exchange, people can be connected at their own expense to the post-office of the specified town or village in order to make use of the toll line from their house.

Small switchboards are provided and worked in such post-offices by the Government, and the subscribers have to pay to the Government 24 yen per annum for the service as well as for expenses for the maintenance of the line, the instrument, etc., which by the agreement must be entrusted to the Government. Seventeen such special exchanges are now working.

The financial condition of the telephone undertaking is a satisfactory one as shown by the following table:

TELEPHONE FINANCIAL STATISTICS.

Year.	Expenditures in yen.	Receipts in yen.	Capital in yen.
1895	91,548	142,616	.....
1900	964,899	1,533,417	.....
1903	1,230,592	2,670,631	12,618,658

The work is partly suspended for the present, owing to outbreak of the war, but when the peace is restored and commercial activity is resumed, it will, no doubt, be continued to meet the public requirements.

LOADED TELEPHONE LINES IN PRACTICE

Paper Presented at The International Electrical Congress at St. Louis.

By Dr. Hammond Vinton Hayes.

THE mathematical discussion of the theory of loaded telephone lines has been fully given in the writings of Prof. M. I. Pupin 1 and Dr. G. A. Campbell.2 In the present paper it is intended to state briefly the results which have been obtained by the use of loading coils on many of the telephone circuits of the Bell companies.

In every problem affecting the transmission of telephone waves over a line, there are two factors to be considered—the attenuation and the distortion of the waves. The loss of energy of the waves upon the line must be kept at a minimum and the several component waves of the telephone or voice waves must be transmitted without unequal relative impairment.

DISTORTION.

The introduction of lumped inductance in the form of loading coils upon a telephone line tends to increase the distortion by the possible unequal reflection of the component waves of different periodicities, and by the possible unequal attenuation of the several waves in passing through the coils.

REFLECTION LOSSES.

The mathematical work of both Pupin and Campbell showed conclusively that if several loading coils lay within a wave length on any particular loaded circuit, and the coils themselves were theoretically perfect, the circuit was distortionless. The spacing of the coils upon a circuit in practice, therefore, depends simply upon a determination of the highest periodicity that should be retained in the telephone waves in order to maintain the character of the voice waves unimpaired. It has been found convenient in studying the spacing of loading coils to consider the number of coils which would be passed by a wave front on each particular circuit in the unit of time, or a second. As the velocity of all waves upon a given circuit is the same, and as the wave length for any periodicity can be readily determined from the velocity, this convention makes it possible to readily determine the number of coils lying within any particular wave length.

A large number of long telephone circuits have been equipped with loading coils, the spacing of the coils upon the several circuits being such as to produce a range of the number of coils per second between 13,000 and 7000. A comparison of the transmission over these several circuits has shown that the quality of transmission is not appreciably impaired even with the lower number of coils per second. This seems to indicate the lack of importance of the overtones of very high periodicity in the successful transmission of speech.

It can be said, therefore, with considerable certainty that the distortion due to reflection losses in a loaded telephone circuit can be neglected, provided the coils are so spaced upon the line as to give at least 7000 coils per second, and that this spacing of the coils is substantially uniform throughout the line.

DISTORTION IN COIL.

To entirely eliminate distortion in a loading coil, it is necessary to have it so designed that the effective resistance of the coil to all the essential periodicities of the telephone waves shall be the same. Such a coil is theoretical, and cannot be obtained in practice. A loading coil is primarily one so designed as to provide a required amount of inductance, and must, of necessity, consist of several turns of wire. Moreover, to prevent attenuation, it is imperative that the resistance of the coil be kept as low as possible. To make the resistance of the coil low, the wire employed should be of copper of large size, and the number of turns of wire in the coil should be kept small. A reduction in the turns can, other things being equal, be most easily obtained by the use of iron for the core of the coil. If the coil is made entirely of copper, the effective resistance of the coil with the frequencies within the range of telephone periodicities will differ from the resistance by an amount corresponding to the losses due to eddy-currents in the copper. If iron forms a portion of the coil, there will be, in addition to the eddy-current losses in the copper, eddy-current losses in the core, as well as hysteresis losses in the iron, which will augment the difference between the resistance and the effective resistance. As it is impossible to eliminate the eddy-current and hysteresis losses entirely, the effective resistance of a loading coil will vary with

1. *Trans.* Am. Math. Soc., July, 1900; *Trans.* Amer. Inst. Elec. Eng., Vol. xvii, May, 1900.
2. *Phil. Mag.*, March, 1903.

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different periodicities, and thereby tend to produce distortional losses in the transmitted telephone waves. The difference between the resistance and the effective resistance, at telephonic periodicities, can be made much smaller in a coil composed entirely of copper than in one having an iron core.

Practical and commercial reasons demand an iron-cored load-

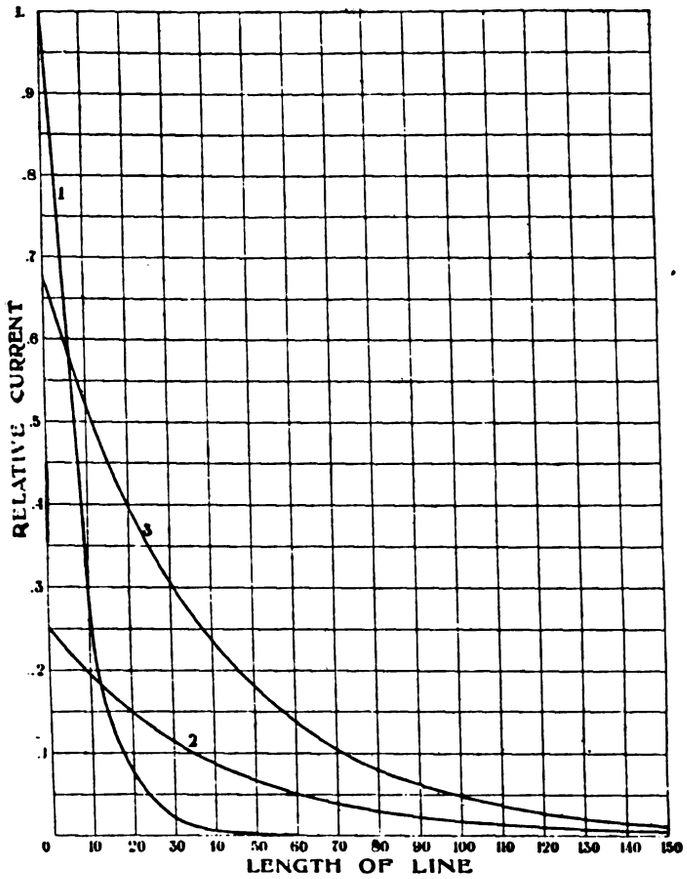

FIG. 1.

ing coil, provided that such a coil can be so designed that its use in a telephone circuit will not be productive of appreciable distortion. To determine whether, in practice, there was appreciably more distortion introduced by loading coils having iron cores, as compared with those made entirely of copper, the two circuits first loaded were equipped, one with iron-cored coils, and the other with copper inductance coils. The circuits were each about 1000 miles in length. The coils used on these two circuits were spaced alike, and had the same inductance and approximately the same resistance. The effective resistance of the coil having an iron core was about 15.5 ohms at a periodicity of 2000 per second and that of the copper coil 11.8 ohms at the same periodicity. These circuits thus loaded were compared with each other with the greatest care and no difference was apparent either in the character, or quality, of the telephone transmission. These tests are again confirmatory of the fact that the suppression or reduction of the waves of the highest periodicities of the voice waves does not appreciably affect the quality of intelligibility of transmitted speech. This experiment was considered as demonstrating conclusively the possibility of the commercial use of loading coils having cores of iron.

LOADING COIL.

A discussion of the theoretical dimensions of loading coils for different classes of circuits may be found in Dr. Campbell's paper, to which reference is above made. In practice the size and cost of the coil are factors requiring serious consideration. For aerial circuits, where the size of the line wire is large, and consequently the resistance of the circuit small, it is of the utmost importance that the effective time-constant, $\frac{L'}{R'}$ of the coil should be made as large as is consistent with reasonable cost. Except so far as the cost is affected, the size of the aerial loading coil is of no special moment, as the coils can be mounted singly upon the poles. The time-constant of a coil can be increased by enlarging its size, but such increase in size increases its cost. The best commercial loading coil is, therefore, the smallest coil that will give the required inductance and the largest effective time-constant.

Following the theoretical considerations as deduced by Dr. Campbell, the resistance of the coils which have been used on aerial circuits has been made 2.4 ohms. The design of the core, the permeability of the iron, the subdivision of the iron and the copper have been made such that a loading coil has been produced having an inductance of .25 of a henry, a time-constant of .048 second, at a periodicity of 1000 periods per second, and a bulk of approximately 314 cu. ins. This coil is toroidal in shape, 10 in. in diameter and 4 in. high. It has an effective resistance of 15.5 ohms at 2000 periods per second.

Coils designed to be used on cable circuits in which the size of wire employed is much smaller do not require to be made of as low resistance as the coil above described; consequently their size and time-constant may be made much smaller. Large numbers of cable loading coils have been placed in service, their design varying with the character of the circuit upon which they were used.

REFLECTION.

In the terminal apparatus at present used in telephony, or where there is a condition of non-uniformity in the character of the line, the telephone waves suffer a reflection, which, in many cases, is effective in materially increasing the attenuation. This

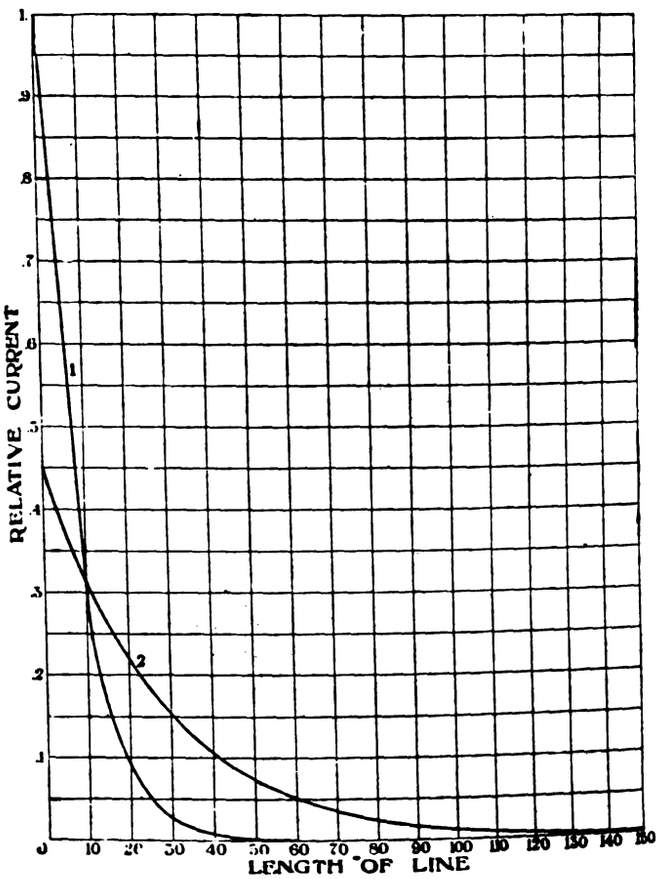

FIG. 2.

reflection is particularly pronounced at the point where an unloaded section of line is connected to a loaded section. The amount of reflection is greater the greater the divergence from homogeneity. Thus a section having large inductance per mile, when connected with a non-loaded section, exerts a larger reflective action than one having a small inductance per mile.

In practice, the effect of reflection is of very considerable im-

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portance, particularly when the loaded section is not relatively long. Theoretically, these reflection losses may be eliminated by the use of a perfect transformer introduced at every point of non-uniformity in the line. Even could such a perfect transformer be made its introduction on commercial circuits is open to practical objections, and, as a substitute, its equivalent, in the shape of a series of coils of varying inductance, has been employed. This arrangement of coils of varied inductance is known as a "terminal taper." The arrangement of the several coils constituting the taper is such that a coil having an inductance somewhat less than that of the coils used on the loaded section is placed nearest the loaded line, a coil of inductance somewhat less than the first taper coil is placed next in order, and a coil of small inductance is placed nearest the non-loaded section, or the terminal apparatus. The spacing of the coils in the taper corresponds with that of the coils of the line of which it is to form the terminal.

RESULTS OBTAINED ON COMMERCIAL CIRCUITS.

The following figures illustrate the results which have been obtained on several typical commercial circuits. In what follows, all comparisons are made on the basis of relative attenuation between similar circuits loaded and unloaded, without reference in any way to distortion or quality of the transmitted speech. The curves shown in these figures are the results of actual tests, made on commercial loaded circuits, using standard terminal apparatus at the transmitting and receiving stations.

LOADED CABLE.

In Fig. 1 are shown the results obtained in tests of a heavily loaded standard telephone cable. In this cable the wires are .03589 of an inch in diameter, having a resistance of about 96 ohms per mile of circuit. The mutual capacity between the two wires of the circuit is .068 of a microfarad per mile. The inductance added to the circuit by the loading coils amounted to about .6 of a henry per mile. In this figure the abscissæ represent lengths of cable and the ordinates the relative strengths of current. Curve 1 is that representing the attenuation of current on an unloaded circuit as the length of cable is increased.

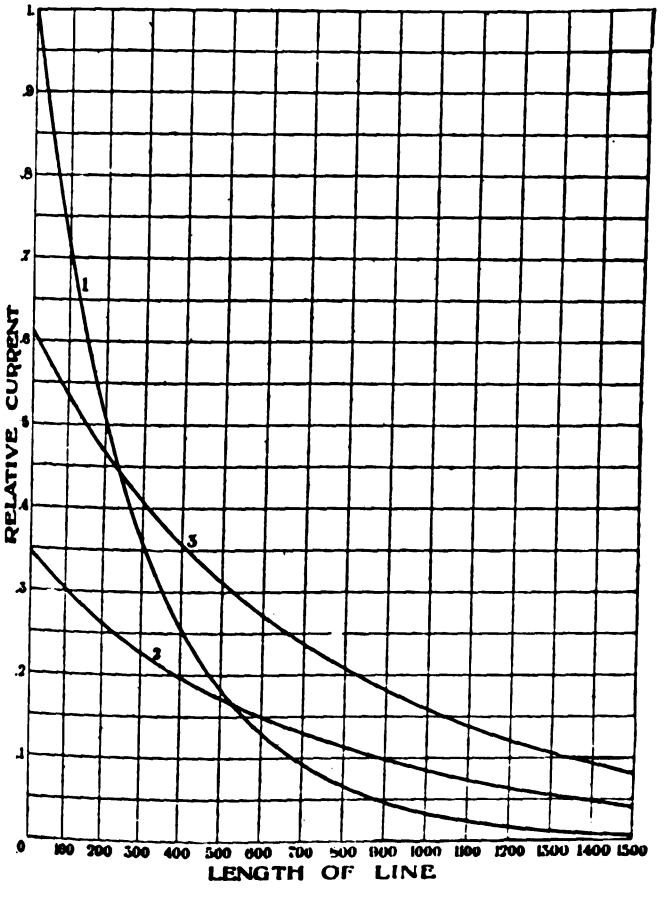

FIG. 3.

It will be seen that the attenuation increases very rapidly as the length of cable is increased. Curve 2 represents the attenuation on a similar circuit but loaded as above described, the terminal telephone apparatus being placed directly at the ends of the loaded cable, thereby obtaining the full effects of reflection. It will be noticed that the initial current on the loaded circuit is about one-quarter of what it is on the unloaded circuit. Moreover, the transmission on shorter lengths of the loaded circuit under these conditions is much poorer than the transmission over similar lengths of the same cable circuit unloaded. But the rate of attenuation per unit of distance is much less on the loaded than on the unloaded circuit; so that for the longer lengths of circuit the transmission is superior on the loaded circuit to that on the same lengths of unloaded circuit. Curve 2 shows the attenuation when no terminal tapers are employed and the reflection is a maximum. If terminal tapers are employed at the two ends of the loaded circuit and the telephone transmitting and receiving apparatus is connected directly to the tapers, the attenuation on the loaded circuit is represented by Curve 3. Here again it is seen that the initial current is considerably less than that on the unloaded circuit and that the transmission on short lengths of circuit is better on the unloaded than on the loaded conductors, but the introduction of the tapers on the loaded circuit has more than doubled the initial current and has shortened by about one-half the length of circuit which showed the unloaded circuit superior. A comparison of Curves 2 and 3 shows how great a factor the reflection losses are between the terminal apparatus and a loaded circuit and the importance of the taper in reducing these losses. In practice it has been found that reflection losses can be still further reduced and under special conditions almost, if not entirely, eliminated.

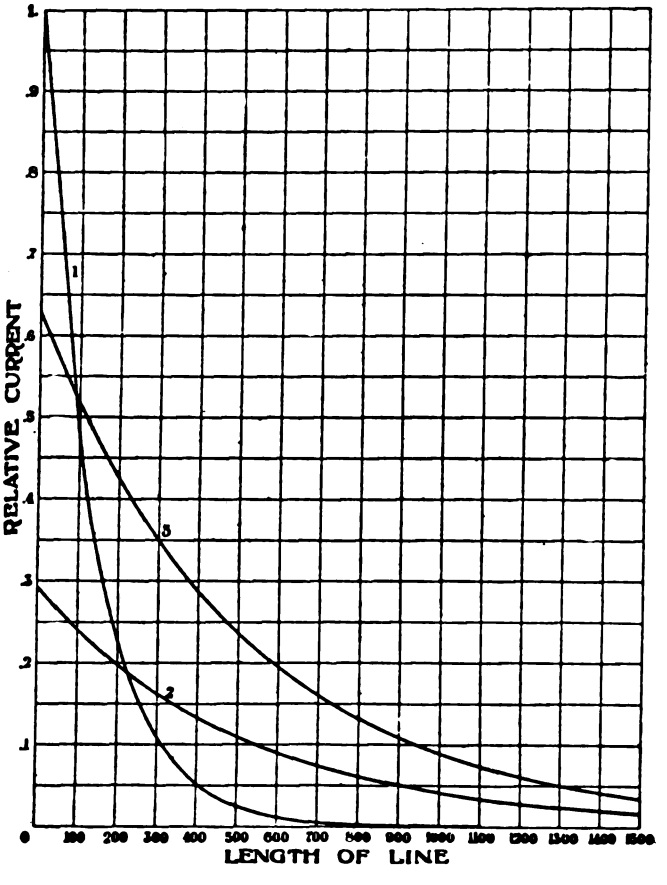

FIG. 4.

In the case above described a large amount of inductance has been added to the circuit. The results which have been obtained upon cables where less inductance has been added are shown in Fig. 2. In this case the cable is substantially similar to that

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previously described. Upon it loading coils are placed so as to bring the inductance of the circuits up to approximately .17 of a henry per mile. In other words the inductance is less than one-third of that in the case just described.

In Fig. 2, Curve 1 is similar to that in Fig. 1 and represents the attenuation of the telephone current in an unloaded circuit in the cable. Curve 2 represents the attenuation in the lightly loaded circuit when no tapers are employed and the telephone transmitting and receiving apparatus are placed at the terminals of the loaded cable. It is to be noted that the reflection losses are much less in the case of the lightly loaded cable than is the case in that having the heavier loading. In fact for shorter lengths of cable the lighter loading is more effective in transmitting the telephone wave than the heavier. For longer lengths, however, the heavier loading gives better results. With proper apparatus at the terminals of the loaded cable to reduce reflection losses, much less attenuation would result than is indicated by Curve 2.

LOADED AERIAL CIRCUITS.

In Fig. 3 are shown the results which have been obtained on open-wire circuits composed of copper wire weighing 435 lbs. to the mile. On these circuits loading coils were so placed as to make an inductance of about one-tenth of a henry to the mile. Curve 1 shows the attenuation with various lengths of line upon a similar unloaded circuit, and Curve 2 shows the attenuation on the loaded circuit when the telephone transmitting and receiving apparatus are placed directly at the ends of the line without tapers. Curve 3 shows the attenuation under similar conditions when tapers are employed. The results resemble those obtained with loaded and unloaded cable. There is a large reflection loss which is considerably reduced when tapers are employed. Even with tapers the loaded line for shorter distances is inferior to the unloaded. The point particularly to be noticed is the relative slope of the curves in the two cases indicating that the benefits to be obtained from loading open-wire circuits are less than with cable circuits.

Fig. 4 illustrates the results which have been obtained from loading open-wire circuits using a conductor weighing 176 lbs. to the mile and having an added inductance equal to about .1 of a henry to the mile. As before, Curve 1 represents the attenuation on a similar unloaded circuit; Curve 2, the loaded circuit without tapers, and Curve 3, the loaded circuit with tapers.

GENERAL CONSIDERATIONS.

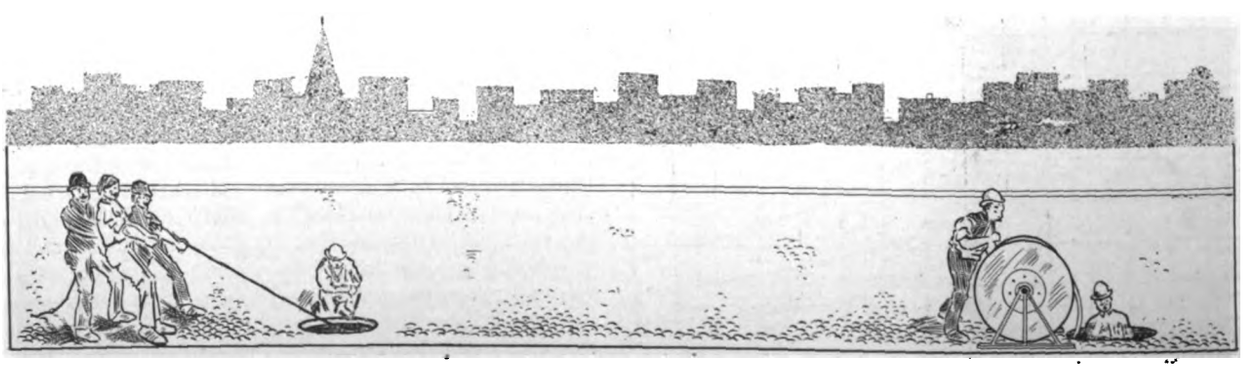
The above curves show the results which have been obtained by the use of coils of considerable inductance added to open-wire and cable telephone circuits and may be considered as typical of the results obtained on similar circuits of different capacity or composed of wire of different size. As before stated the curves illustrate simply the relative volumes of transmission under the various conditions described.

In the case of cables there is a distinct improvement in the quality of the transmission produced by the introduction of the loading coils, the voice of the speaker being received more distinctly. The high insulation which can be maintained at all times on cable circuits renders it possible to introduce loading coils upon the circuits without danger of materially augmenting leakage losses. The marked diminution in attenuation, the improvement in quality of transmission and the ease with which inductance coils can be placed on cable circuits without introducing other injurious factors, such as leakage or cross-talk with other circuits, renders the use of loaded cable circuits especially attractive.

The reduction of attenuation that can be obtained by the introduction of loading coils on air-line circuits, even under theoretically perfect conditions, is less than can be obtained on cable circuits. This difference in the effectiveness of loading between the two classes of circuits, as far as attenuation is concerned, can be explained by the fact that on a cable circuit the capacity is large and the inductance of the circuit itself is practically negligible, due to the proximity of the two wires of the pair. On aerial circuits, on the other hand, the distance between the outgoing and return wire is such as to make the capacity of the circuit much less, and its inductance much greater. This larger self-induction of the open-wire circuit operates to decrease the attenuation, and, as it were, to rob the loading coils of part of their usefulness. Again, the insulation of an aerial circuit cannot be maintained as high as that of a cable circuit, so that the added inductance due to the introduction of loading coils upon the line tends to increase the losses due to leakage.

Moreover, there is not the same improvement in the quality of transmission on a loaded aerial circuit as compared with a similar circuit unloaded, as is found between loaded and unloaded cables. Initially, open-wire circuits are practically free from distortion, whereas the distortion on cable circuits of long length is considerable. The addition, therefore, of loading coils to aerial circuits cannot be expected to effect any improvement in the quality of transmission, whereas in the case of cables the introduction of the additional inductance renders the circuits practically distortionless and effects a marked improvement in the clearness of the transmitted speech.

In presenting this brief summary of the operation of loaded telephone circuits, it is desired to make acknowledgement to Mr. H. S. Warren and Mr. E. H. Colpitts for the solution of the many problems involved in the design of suitable coils for use in carrying out this invention, and to Mr. W. L. Richards and Mr. A. N. Mansfield for the careful tests upon which the curves above shown are based.



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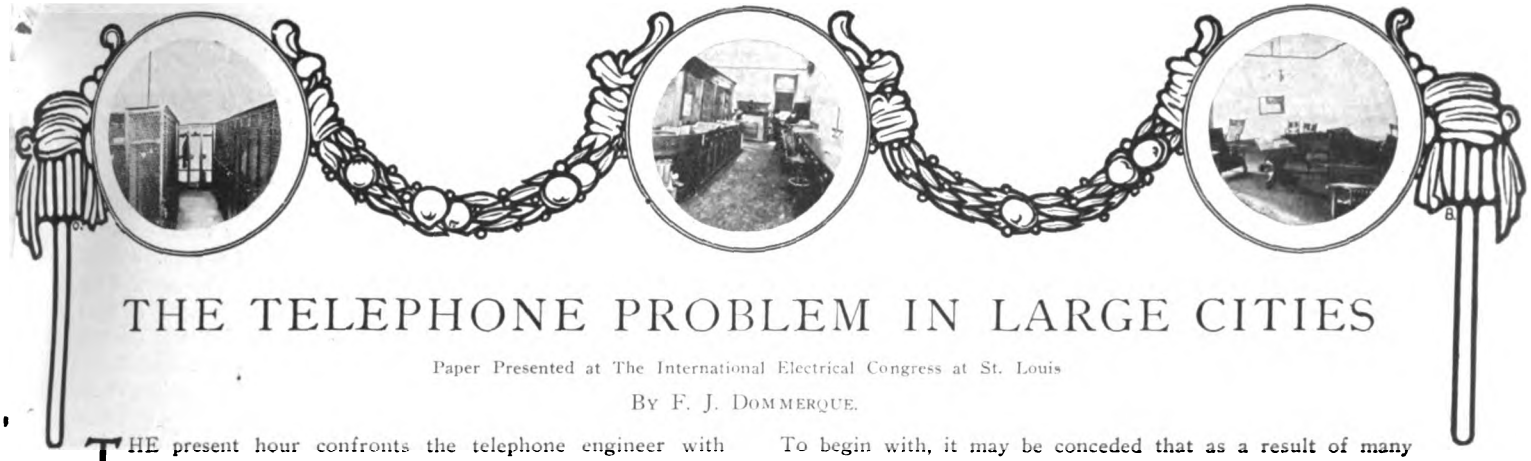

THE TELEPHONE PROBLEM IN LARGE CITIES

Paper Presented at The International Electrical Congress at St. Louis

By F. J. Dommerque.

THE present hour confronts the telephone engineer with the problem to find adequate and economical ways and means to provide proper telephone service for many large cities, where the number of telephone users has increased enormously in late years, caused by a better appreciation of the usefulness and convenience of the telephone and the decreased cost of telephone service. In the last decade the population itself has shifted under the expansion of rapid transit; on the one hand the business men congregating in huge office buildings, on the other hand the residential districts radiating far out into the country. These altered conditions must be taken into consideration in the arrangement of new switching apparatus, which is to replace old equipment, now inadequate, obsolete and worn out.

When speaking of large cities, it would be drawing the limits too close to consider only New York and Chicago and the capitals of the old world; all cities with more than 100,000 inhabitants should be included and in fact all that will be said for cities of 100,000 pertains equally well to cities of smaller population, as long as they can be termed cities at all.

Telephone service must be reliable in all cases; it also must be quick and not involve any operation on the part of the subscriber. The cost of service must be reasonable; the business man can and will pay a greater amount for good service than the residence subscriber, but there should be no difficulty in arranging rates satisfactory to the latter by a judicious use of party lines and measured service.

It has been the general rule up to the present time to divide a large city into a number of districts; to locate a central office in each district and to connect these offices by trunk lines. When economy only is taken into consideration, this method of handling the telephone business is probably correct as in large cities the actual minimum of annual expenditure will be obtained with more than one office district, because the expense for the wire plant, which is the principal item of annual expense, decreases with increasing number of office districts, while the other items that contribute to the annual expense increase up to a certain point where the sum of all items gives a true minimum.

Paying, however, due respect to the quality of service, it is a plain fact that with the introduction of trunking the service must become less efficient, because, to begin with, it takes more time to put through a trunk call than a local call; as all trunk calls must be handled by at least two operators a greater liability to human errors is introduced; trunking also increases the apparatus and cable in the office, tending thereby to deteriorate the quality of transmission; and, finally, no matter how good the discipline of the operating room may be, it generally happens that in the busiest hours of the day when the service should be most rapid, all the trunk lines are in use and subscribers are forced to wait for connections. The trunking troubles are still more aggravated by the necessary evil of order wires. It is a wonder how in large cities where the percentage of trunking is very high, the operators are at all able in the busy hour to distinguish between orders. Anyone who ever listened in on an order wire circuit in a busy exchange will be convinced of the difficulties in that respect. If, therefore, money was no object, the ideal way of giving telephone service would be to bring all subscriber's lines into one switchboard. Looking at the problem from a physical standpoint, there is a limit to the size of the switchboard.

To begin with, it may be conceded that as a result of many years experience the multiple form of switchboard has shown itself as most adapted to satisfactory service. As a multiple board demands all subscribers to be in reach of every operator, it is absolutely necessary to decrease the size of the multiple jacks with increasing number of subscribers. The greatest number of lines that can be accommodated in a multiple section with the smallest jacks at present in commercial service (jacks with three-tenth inch centers) is 20,000 in an A section (a section upon which only local and outgoing trunk work is done), and 25,000 in a B section (a section used for incoming trunk work only). The capacity of a B section is greater on account of the gain in space by the absence of the answering jacks and signals and outgoing trunk jacks. However, 20,000 lines does not necessarily mean 20,000 subscribers; as by the aid of party lines and private branch exchanges the number of subscribers may be greatly increased.

Party lines being mostly used in residence districts, where the lines are of considerable length, effect a great saving in line expense and consequently permit of lower rates, which circumstance increases the number of residence subscribers; party line service naturally tends to increase the size of an office district.

Assuming that the use of telephones would become so general that one telephone would be required for every five people, and assuming furthermore that one-half of the telephone equipment would be used for a single line service, and the other half for party lines and private branch exchanges; and that the party line and private branch exchange subscribers would require only one-third as many lines as the other subscribers, in other words that three times as many party line and private branch exchange subscribers could be accommodated as there is line equipment in the switchboard, then with a board having a capacity of 20,000 multiple jacks, 10,000 single line subscribers and 30,000 party line and private branch exchange subscribers or a total of 40,000 subscribers could be given service without necessitating the use of more than one office. According to the above made assumption this would correspond to cities with not more than 200,000 inhabitants, or better expressed, all cities that will not increase to more than 200,000 inhabitants during the life of the switchboard.

There exists the possibility of extending the use of a single office to a larger city than 200,000 population by the aid of so-called "division systems," sometimes termed group-systems. Such systems subdivide a multiple board into two or more divisions so that only one-half or one-third or one-fourth the number of lines (according to the number of divisions) are multipled in each division, while *each* division contains answering jacks and signals for all the lines. A two-division board thus would contain 20,000 multiple jacks of the three-tenth inch type in each section of each division, giving a total of 40,000 lines. There would have to be a total of 80,000 answering jacks and signals, as each line would have to appear in *each* of the two divisions.

This doubling of answering jacks and signals, however, does not mean doubling of space, as in a two division system the answering jacks can be spaced close together (20 per strip), while in a straight multiple board they are spaced 10 per strip for good service; because in a two-division board are twice as many jacks for the same number of originating calls as in a straight multiple system. Seven years experience with division

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boards has established the fact that more than two divisions will not give good and economical service; four divisions can give *good* service, but the service is not *economical* principally on account of the practical impossibility of using an intermediate distributing board, since the cross-connecting wires become unwieldy; hence, the possibility of distributing the load evenly over the operators or rather the possibility of loading each and every operator to the limit, is excluded. With two divisions the use of an intermediate distributing board is practical as not more than a three-pair cross-connecting wire is required.

Therefore, with a two-division system, 20,000 single line and 60,000 party line and private branch exchange subscribers can be accommodated on 40,000 lines in the switchboard, whence the use of a single exchange may be extended to cities with a population of 400,000.

Many telephone engineers are unfavorably disposed toward anything that involves labor on the part of the subscriber, and in a two-division system the subscriber would have to press one of two buttons upon his instrument according to the division upon which the desired subscriber is located; and this operation though involving only a minimum of attention on the part of the subscriber, is not quite as simple as just lifting the receiver off the hook to signal the operator. Where a two-division system should not find favor, the city must be divided into districts and trunk lines must be used. In such a case the number of districts should be kept small in order to keep the trunking in narow limits. In fact the trunking should be kept below 50 per cent., in other words, of all the originating calls not more than one-half should be trunked. This can best be accomplished by establishing one office with a 20,000 line board in the center of the densest telephone population, then select clusters of less dense telephone population and provide each of them with an office and trunk between them. In this arrangement all boards would be multiple boards as there would be sufficient local business to require a multiple on the A sections.

As soon as the district of *dense* telephone population becomes too great for one office, and, therefore, must be subdivided into more districts, the percentage of trunking will naturally rise; and from experience it is known that in New York and Chicago for instance the percentage of trunking exceeds 60 per cent. and has been considerably higher at the time when the offices or rather the switchboards were smaller. When the percentage of trunking is high the multiple in the A boards is not used much and it raises the question if it would not be better under the circumstances to trunk all the calls so that the A board would be a receiving board only, while the B board would contain a large multiple. Doing this, should offer an opportunity to simplify operation as the A operator's circuit could be made very simple. Also time should be saved in the average duration of a call on account of simpler and more uniform manipulations, in other words when all calls are trunked it should take less time to put up a connection on a trunk line than where only part of the calls are trunked.

From the aforesaid it follows that in an exchange without trunking the best service can be rendered and that the quality of service deteriorates with increasing percentage of trunking. It also is a fact that with large office districts the annual expense is greater than with small office districts. The question arises which of the two, better service with greater expense or inferior service with minimum of expense should be selected; or is there a compromise.

Where competition exists, as is now the case in all large cities of the United States with the exception of New York and very few others, that company which gives the best service is most liable to find the greatest favor with the public. Where the telephone service is in the hands of the government like in all principal European countries, the government certainly desires to give the best service if it only can raise the money. It seems, therefore, reasonable to say that the best service should be made the rule and that every effort should be made to render this best service with the least expenditure.

The principal item of expense entering into this problem is the line expense. Any reduction therein will be in favor of larger office districts, district being here relative, meaning a district containing a great number of subscribers and not necessarily covering a large area, though the larger the area the more marked the difference in expense will appear.

With large office districts more lines can be concentrated into heavy underground runs, which will reduce the relative cost of the conduit system. Larger cables can be used and larger cables are cheaper per conductor than small ones. The demand for larger cables has prompted the cable manufacturer to build cables with four hundred and more pairs. Of course the conductors in these cables had to be of a finer guage than had been the custom heretofore, but the development in transmitter design kept pace with the progress in cable manufacture so that these cables with fine guage wire do not deteriorate the transmission as long as the capacity is kept in reasonable limits. All these briefly mentioned items are in favor of large as against small office districts.

The introduction of party line service in the residence district has made the proposition of large offices still more favorable. With small office districts the management often was doubtful whether party lines would really be money savers, because the parties as a rule were located so far apart that the common line from the exchange to the point or points of connection with the party lines plus these party lines did not cost much more than individual lines direct from the exchange to each of the parties; the saving in the line expense in that case did not seem to be in accordance with the decreased revenue per party line. With large office districts the common line from the exchange to the connecting points is most likely long in comparison to the party lines and, therefore, a real saving results.

On the other hand improvements have been and are constantly made in the design of trunk circuits; the principal step in advance being the introduction of automatic features like automatic or machine ringing, which secure simpler operation and reduction of time, but involve complication in the apparatus.

In the now so largely exploited Strowger automatic telephone system trunking is carried on entirely automatically, the subscriber being made to perform what little is left of operating. This is a case of going to the other extreme where all calls as far as large exchanges are concerned involve trunking and where all the trunking is done automatically in the exchange with at present very complicated apparatus. It is not the purpose of this monograph to enter into a discussion of automatic versus manual exchanges; it may only be assumed that the automatic exchange can be made practical and it may further be expressed as a personal opinion that the vertical and rotating movement as applied in the Strowger switch is the keynote of automatic working.

With this in mind the exchange problem in large cities becomes entirely different. The trunking no more affects the service and, therefore, the choice between large and small offices or office districts resolves itself into a problem of economy pure and simple. In this case the engineer must find the true minimum of annual expense and be guided thereby in the selection of the number and location of the offices. The sum-total of automatic apparatus will be the same whether all concentrated in one building or scattered over many. The length of the trunk lines, however, varies, being shortest with all the switches in one building and increases with the increasing number of and distances between offices. The reverse is the case with the subscriber's lines, and there can be found a balance where, certeris paribus, the expenditure on trunk lines plus the expenditure on subscriber's lines gives a minimum.

So far the term "service" has been used to designate the more or less satisfactory arrangement and working of the apparatus either by operators or automatically; another phase of service is represented by the quality of the transmission of speech. Not much need be said in relation to this, as there are obtainable the most efficient transmitters and recievers, and it is only a matter of dollars and cents to obtain same; it is furthermore a question of finances to build the lines so that they will present sufficiently high insulation, low enough resistance and balanced induction and capacity.

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Stress is here laid upon a good talking circuit for the reason that with the introduction of automatic exchanges this most essential requirement in any telephone enterprise has been sadly neglected. The advent of the Strowger Automatic exchange has also caused a return to the local battery at the subscriber's station for talking, which is contrary to the trend of the present moment toward centralization in all manually operated exchanges. Also the necessity of a ground connection at the subscriber's premises for signaling purposes is against modern practice.

After having disposed of the local exchange requirements for large cities, a few words may be added with regard to the toll and long-distance facilities that should be provided. Both the toll business and the long-distance business being of the same nature and closely allied, one switchboard seems to be preferable for both kinds of service. The switching apparatus for this purpose should be so located that either no cable at all or only a minimum amount would enter between the toll and long distance lines and the point where the same are switched to the local subscriber's lines.

As the toll and long distance lines are very costly they ought to be loaded to the fullest extent; to do this effectively the operator should be enabled to keep the lines busy all the time, therefore, only a few lines should be assigned to one operator (in Germany they assign only two lines to one operator) and provision should be made to make the connections with the utmost speed. For outgoing calls for such subscribers as frequently use the toll and long-distance lines provision can be made to call the toll board direct without going first through the local board, by providing a double signaling device; one being the regular signal upon the local board, operated by the subscriber taking the receiver off the hook, the other one being a second signal terminating in a distributing operator's section of the toll boards; this signal being arranged similar to the second signal in a two-division signaling system previously alluded to and being operated by the subscriber's pressing a button.

For incoming toll and long-distance work the same subscribers may have their lines multiplied through the toll board so that every operator can connect to them direct.

All toll boards in large cities should be provided with ticket carriers, something along the line of the cash system in large department stores which are operated by compressed air or belts.

By the use of composite circuits much time can be saved, as the calls may be ordered up by telegraph, leaving the lines ready for actual conversations.

A PECULIAR CASE OF INDUCTION

By Arthur Rich.

OWING to the fact that a large number of the small exchanges that are in existence at present, and a large number that will be built in the future, are operated under the "McClure" principle of common return; and the electric light and power systems in small towns are using alternating current of from 1,000 to 2,000 volts potential, the trouble-man in a small exchange often confronts difficult problems in the line of peculiar cases of induction. Such a case recently came under my observation, and owing to its peculiar phenomena it may be of interest to some of my fellow "trouble shooters."

The difficulty was a peculiar hum in the operator's head receiver when no lines were connected and no cams were open. The system is a well-constructed "copper return," with poles in the alleys. The electric light system is of the alternating type, using a current of 2,000 volts potential, with poles in the streets. The current for the entire business district is transformed down to 100 volts by two dry-cored transformers, placed on poles in the street. The wiring for the exchange comes in on the ceiling near the switchboard, and there is a droplight directly back of the switchboard.

A few instances of the interesting phenomena were, that when the operator stood directly under the light conversation would be impossible on account of the roar, while fifteen feet away toward the distributing frame it was perfectly silent. Going in the opposite direction the hum decreased slightly. The hum might at any time be entirely stopped by the operators touching the transmitter with the hand. Withdrawing the receiver plug from the jack stopped the hum, but on bringing the plug within three inches of the transmitter it was as loud as when plug was in position. A telephone placed anywhere in the room, away from the distributing frame, entirely disconnected from anything, displayed the same phenomena as the switchboard, only in a less marked degree.

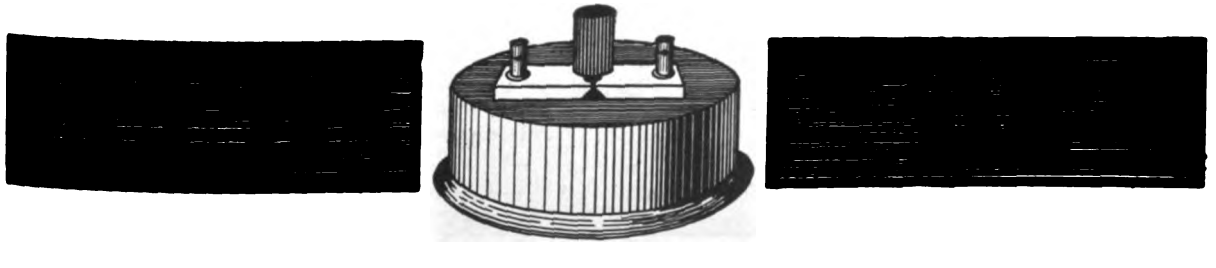
Technical journals were consulted to no avail, but I finally happened to notice a peculiar wiring of the transformer, and on investigation found that it was so wired as to bond one side of the primary and secondary, while the other side of the primary was grounded. This, of course, threw the normal 100 volts between the two sides of the line, but left a pressure of 2,000 volts between one side and the ground. This cleared, our trouble was over.

Our theory is that the 2,000 volts pressure flowed electrostatically to the nearest ground conductor, which was the distributing frame, and taking the path of least resistance flowed through the receiver.

The operator standing directly under the light was at the point of highest potential, consequently the loud hum on going toward the distributing frame; the potential rapidly decreased until it became zero at the ground conductor. The switchboard is so wired that the frame of the transmitter is grounded, so when the operator touched it he became the point of zero, thus stopping the flow through the receiver.

I am informed by electric-light men that 2,000-volt transformers often become punctured, bonding the primary and secondary. They also state that it is their custom to "Let 'em go so long as they don't waste too much current."

Telephone men would do well to see that such things are not let go, as it is dangerous, not only to their apparatus, but also to the life and limb of their workmen and operators.



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FEATURES OF THE DUNBAR TWO-STRAND COMMON-BATTERY SYSTEMS

Paper Presented at the International Electrical Congress at St. Louis.

By Prof. J. C. Kelsey, *Purdue University.*

WHEN a company or engineer, or group of engineers, enter upon the development of a certain line of business, based on an original idea, their succeeding efforts seem to follow along a well defined and slowly widening path. Nothing revolutionary appears on the surface, and the improvements revealed to the customers are simply increments to the original idea. This is particularly true as concerns the telephone industry. During the period of Patent-Office protection, the various developments brought out by the engineers connected with the telephone interests followed each other in a quiet and logical manner,

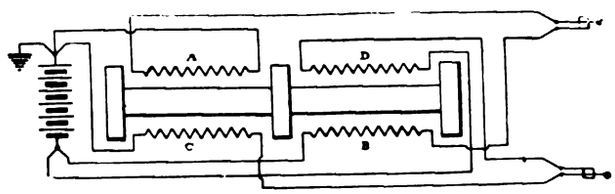

Fig. 1.

and at no time did they depart far from a beaten path. And when the Independent interests were given freedom of thought and action, their efforts followed along this same beaten path. Only for a short time, however, for their work took on the marks of originality, and departed entirely from past traditions. In pointing out the instance where this was accomplished, the features of various succeeding commercial systems will be briefly considered.

One of the first efficient landmarks in the switchboard science is the series grounded system. The earth served as a return, and the low resistance line drop was necessarily dissociated from the line during connection. This was accomplished by a two-strand cut-off jack, having one spring for the talking contact, and a sleeve or thimble to guide the plug, and to hold it properly. The entrance of the plug raised the spring from a rest contact, which was connected to the drop. As the board grew in size, a busy test for the multiple of jacks became necessary, hence the use of sleeve as a test terminal. Having no operative function, otherwise the multiple of sleeves was normally insulated from everything. When the plug was inserted, being of solid metal, it brought the sleeves into contact with the talking circuit, which put them at the potential of the subscriber's earth. To utilize this changed condition of sleeves during usage, a battery was placed in the operator's talking set in such a manner that when the listening key was closed, the tip of the plug assumed the potential of the battery, which, upon coming into contact with a grounded sleeve, caused a flow of current in the operator's receiver, and the subscriber's receiver as well.

The advent of the trolley system changed the telephone map, so to speak. To avoid the disturbances, a metallic circuit became necessary for most of the lines, and its connection with a grounded board was nicely accomplished by placing a repeating coil directly in the metallic line. In many places, the number of metallic lines grew to exceed the number of grounded lines, which led to the demand for a board giving preference to metallic lines, as two repeating coils between two metallic subscribers was far from desirable. This resulted in a somewhat revolutionary step—the bridging, self-restoring drop system.

This system began the era of local electrical actions in conjunction with the talking circuit. The sleeve was still the test terminal, and had the added function of conducting the current through the restoring winding of the drop. The test terminal was normally at earth potential, through the restoring winding, and was raised by the entrance of the plug. To detect this changed condition of the sleeve, the induction coil secondary and the receiver windings were halved, and a ground placed at their center, so that the closing of the listening key would give the test, and the circuit not be unbalanced during ordinary operating. At this stage, the two-strand system stood a chance of usage, but for some reason the designers did not care to use the sleeve as a combination talking and testing terminal. So they added a third contact, or a second talking spring, to the jack, and passed from one-strand into three-strand practice. The repeating coil was still evident, to connect dissimilar lines. But the main, or revolutionary, feature was the departure from the cut-off principle, by the use of a permanently bridged line drop, which was made possible in a multiple system by the simple effacement of the signal proper during a cord connection.

The use of a permanently bridged line signalling apparatus, and its effacement by auxiliary contact means, had its influence upon the next, or common-battery era. In this system, the battery and line relay is permanently bridged across the line circuit, and the line signal proper, or lamp, is effaced, or partially extinguished, by means of devices working in conjunction with the sleeves. For some reason this system has not been given general adoption.

The next system, the present licensee common-battery system,

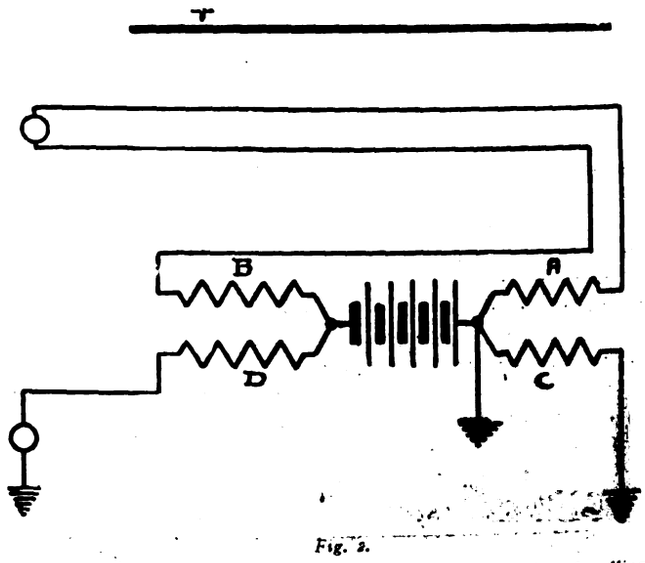

Fig. 2.

shows a return to first principles, inasmuch as the line-signalling apparatus is entirely dissociated from the line when on connection, and the subscribers talk through the clearing-out signal, now known as the disconnection signalling apparatus. The use of three strands came naturally into use, as the restoring winding had the same relation to the sleeve, or test terminal, as the cut-off relay winding of the present system has. In fact, there is not any evidence that the two-strand system was considered.

As the repeating coil is used in the first two-strand common-

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battery system, brought out by the Independent interests, having double disconnect or supervisory signals, it must be shown that while they perform many of the same functions, in both licensee and Dunbar systems, there is a radical and necessary difference. The repeating coil that will operate successfully with the Dunbar circuit will not operate successfully with the licensee circuit. There is a reason, and that is, the Dunbar circuit is confined to metallic lines, while the licensee circuit embraces three conditions of service—metallic and metallic, metallic and grounded, and grounded with grounded.

When the common-battery systems were placed in operation, the cord circuits were equipped with a repeating coil, having four windings, arranged on a core, as shown in Fig. 1. The quarters of the coil belonging to the tips of the plugs, *A* and *C*,

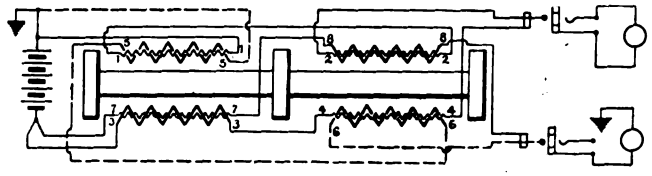

Fig. 3.

are wound on what we may call the left end of the core, while the quarters belonging to the rings, or other talking strands, *D* and *B*, are wound on the right, making two possible separate magnetic circuits, acting in the same direction. In Fig. 2, the use of the coil in circuit is illustrated, in which *A* and *B* are the quarters furnishing current to the metallic line, and *C* and *D* the quarters connecting the grounded party. According to practice, there are three grounds when a grounded line is concerned. One at the subscriber's station, one at the arrester frame, and one at the battery. This means that when a cord circuit is placed in connection with a grounded line, the tip quarter of the coil, *C*, is short-circuited.

If, according to Fig. 2, the metallic line parallels the trolley for considerable distance, both its wires are subjected to an electrostatic potential equivalent to the electromagnetic potential of the trolley wire. These electrostatic charges, alternating in character, are seeking the earth, and pass through windings *A* and *B* on their way. If *A* and *B* presented equal retarding effects to these alternating changes, then balance would result, and a quiet connection given. Unfortunately, the windings *A* and *B* do not present equal effects toward these charges, and great noise results upon a grounded connection. The effects are unequal in *A* and *B*, because the windings *C* and *D* are unequally loaded. *C* is virtually short-circuited, and has the greatest possible weakening effect on the inductive properties of winding *A*. Winding *D* having a line, instrument and common return in circuit does not have as great a weakening effect on *B*, as *C* has on *A*, hence the unbalance, and the consequent noise.

As the licensee companies had an object in maintaining grounded service, a coil had to be devised which would preserve the static balance under all conditions of service. The condition in question is the metallic and grounded connection, which means that the tip quarter of the coil on the grounded side is idle. In Fig. 3, the idle quarter has been represented by dotted lines, as section *5* and *6*. Tip eighth, winding *1* of the metallic side, and the dotted tip eighth winding *5* of the grounded side, start out in pairs at the same end of the core. Likewise, the metallic ring eighth, *3*, starts out in pairs with grounded ring eighth, *7*. On the other side of the core, or end, a double transposition takes place, as *8*, the grounded ring eighth, pairs with *2*, the metallic tip eighth, while *4*, the metallic ring eighth, pairs with the dotted grounded tip eighth, *6*.

The balancing effect may be better shown by Fig. 4, in which the various sections are connected in circuit. As connection with a grounded line renders the grounded tip quarter useless, it will not be shown. An inspection shows that grounded rings *7* and *8* have equal loading effects on each end of the core. By transposition, winding *7* affects the ring side of the circuit at *3*, exactly as *8* affects the tip side at *2*. Therefore, each quarter of the coil on the metallic side presents equal inductive resistance to the alternating static charges.

There has been considerable conjecture among licensee employees as to the reason that the improved eight-section coil will not permit of a ground at the arrester frame, or short-curcuiting of the grounded tip quarter, as did the older four-section type. When a coil gets down on a metallic circuit, the transmission is muffled to a serious degree, when the eight-section coil is used. The reason would be that the old coil had two separate magnetic fields, one of which could be short-circuited or idle without affecting the other. In the newer coil, a short-circuited quarter would affect the entire core, and render it non-inductive, and not efficient as a repeater.

As a non-inductive relay appeared in the Dunbar circuit, nothing yet appears of a revolutionary nature. The series grounded local battery system had a winding in the circuit as a clearing-out signal, through which the voice currents passed. The licensee system has a clearing-out signal through which the voice currents pass. So has the Dunbar original system. What is the difference? The licensee non-inductive supervisory relay has two windings, eleven ohms of copper, and 100 ohms of German silver wire, wound on the exterior of the copper winding, of few turns, and having no inductive value. The 100-ohm shunt did not materially weaken the power of the ten-ohm copper winding in connection with its direct-current functions, but when in the path of voice currents, acts as a direct circuit without any magnetic energy being set up, and consequently does not affect the rapidly changing frequencies to their disadvantage. The non-inductive relay of the Dunbar system is a differential relay, having two windings of equal and opposite value, and having the same relation of the core. If the coils were wound on the respective ends of the core, lines of force would be set up in the respective

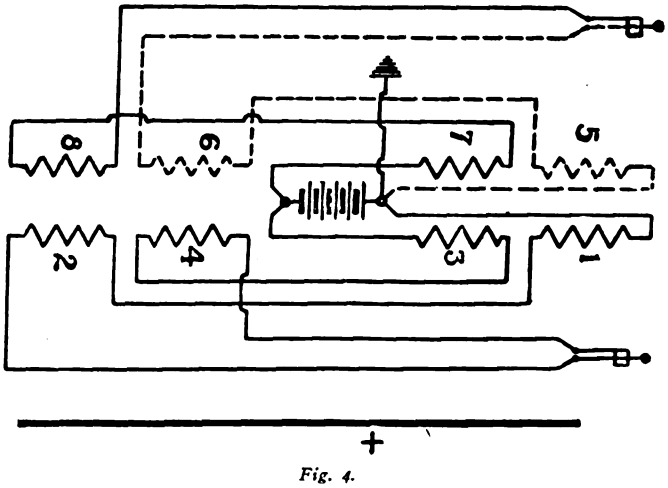

Fig. 4.

ends of the core of opposite value, and neutralization would take place. But when alternating currents of extremely high frequency pass through these windings, a neutralization would tend to take place, but does not, because the lines of force do not have time to thread through the neighboring coil; hence energy is restored to the circuit, which makes the end-on relay inductive to a certain extent. To cause complete neutralization, it must be done electrically, and not through magnetic means. If the coils are superimposed upon each other, then a neutralization takes place between the forces tending to produce magnetic energy, thus killing the evil at its inception.

What is the difference, then, between the Dunbar and the licensee systems, if each makes use of a cut-off relay, a repeating coil and a non-inductive cord relay? There is a great difference in the electrical actions involved, necessitated by the use of a talking strand as the means of operating the cut-off relay, and acting as a test terminal, in addition to its natural function. And, in the absence of the third strand, the act of testing a busy line has to be particularly safeguarded, in order to prevent the subscriber from being seriously annoyed while talking to another party.

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Fig. 5 shows the original Dunbar two-strand system. The subscriber called central by removal of receiver, which allowed battery to flow through line relay, *LR*, out on the line through contact at *a*, thence back to the ground at *b*. The entrance of the plug causes battery to flow through winding *B*, relay *C O R*, thence back to the ground through winding *A*. The current being equal in *A* and *B*, the relay has no magnetic strength, and the lamp circuit of *A L* remains open. Right here is the remarkable feature of the system, that the cut-off relay is energized by current flowing through the talking circuit, without impairing the talking qualities in the least. The energization of relay *C O R* brings out another original feature, the simultaneous disconnection of the line signalling apparatus, and the connection of a normally disconnected multiple jack. This normal disconnection of the multiple jack from the line gives the advantage of a reliable busy test.

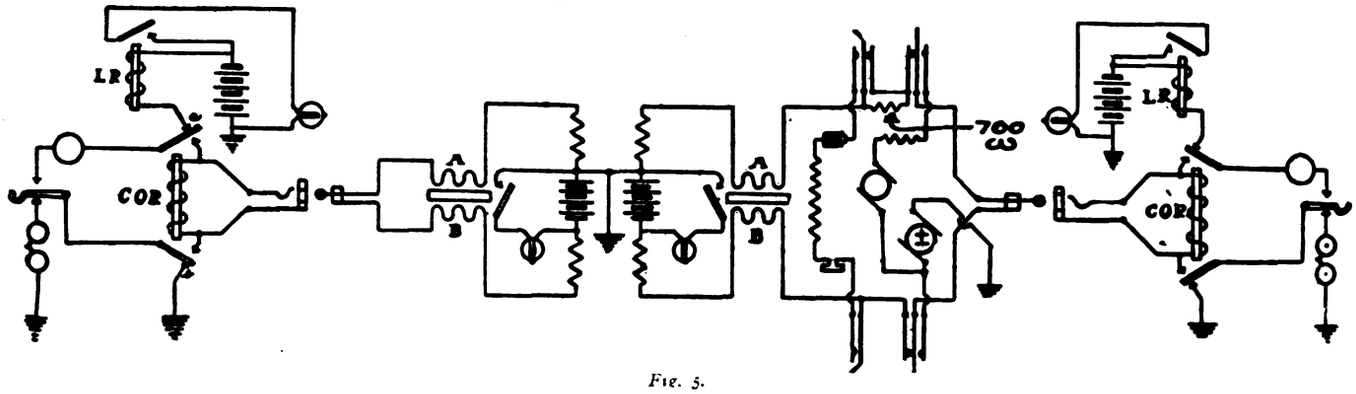

Fig. 5.

Another remarkable feature is shown in the busy test method. The test is a natural one, and the touching of the calling cord tip to the sleeve of a busy line jack, and is similar to that of the licensee systems, inasmuch as the touching of the tip to the busy sleeve stores up energy in the tip quarter of the repeating coil. The withdrawal of the plug tip causes a discharge of this stored energy into the operator's bridged receiver, and into the circuit of the calling party. But the Dunbar subscriber would be painfully aware of the test being made, while the three-strand licensee subscriber would not. The touching of the grounded tip to the sleeve talking terminal would materially lower the potential of the terminal, and cause a vicious receiver click in both talking lines. To prevent this, the listening key is arranged so that its use will remove a short-circuit from about the 700-ohm resistance placed directly in the testing circuit. This modifies the testing click in the subscribers' receivers considerably. There might be an objection to this method, as it introduces a 700-ohm resistance in the talking circuit of two connected parties, should the operator listen in. As she has double supervision, there is no reason why she should do so.

Inserting the calling plug lights the supervisory lamp, because the low resistance ground on the sleeve line side unbalances the differential windings and causes magnetic energy to be operative on the relay armature. More current will flow through *B'* than through *A'*, until the ground is removed by the subscriber removing the receiver. Then the windings neutralize, and the lamp is extinguished.

Another marked feature is the necessity of a temporary source of energy to hold the cut-off relay during the act of ringing. As the multiple is normally disconnected from the line, and its connection with the line depends upon the energization of the cut-off relay, and the energization of the cut-off relay depends upon the current flowing over the cord circuit, it follows that the necessary opening of the cord circuit in the act of ringing shall not deprive the cut-off relay of energy. This was accomplished by means of an alternating-current generator, which was connected to the sleeve side only. A direct-current generator was bridged across the circuit, and supplied the cut-off relay with direct current. Later, it was found that the ordinary exchange battery connected to the tip side through a suitable impedance would accomplish the same purpose as the direct-current generator. The idea is shown in Fig. 6, a later circuit, which supplied generator current out on the tip side, while the main exchange battery supplied energy to the cut-off relay.

At this stage the Independent designers made a revolutionary move. They departed from the repeating coil, they departed from the non-inductive relay, the only semblance being in the cut-off relay principle, though utterly unlike in operation. The era of double disconnect retardation system began. What were the technical reasons why the differential system, with its repeating coil, its non-inductive relay, and ground at the subscriber's station should be relegated, and the retardation system made standard? Both are designed for metallic service exclusively. The principal weakness was in the ground at the subscriber's station, which is objectionable for many reasons. The difficulty of a fair ground for selective ringing is known, while this system had to have a good ground, a real ground, of lowest possible resistance, in order that the differential relay could be

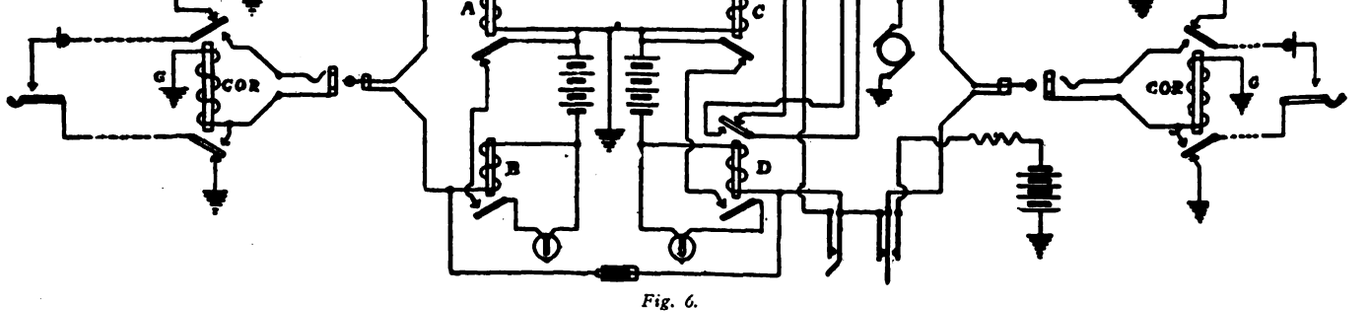

Fig. 6.

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reliably operated. Supposing the grounds to be perfect, another difficulty presents itself—that unrelenting enemy of grounded telephone practice—earth currents due to the street railway companies. Potentials of different values exist on every line, making the operation of the differential relay a great uncertainty. And its peculiar dependence upon its external connections as a switchboard makes it unique, though not a weakness.

When the ground at the subscriber's station was changed to the ground as one terminal of the cut-off relay, *G*, in Fig. 6, the differential relay had to be abandoned, because there is no possible way that a neutralization could take place between windings *A* and *B*, when the subscriber removed the receiver. The 500-ohm cut-off relay would short-circuit winding *A* to a certain extent. So windings *A* and *B* were placed on separate cores, as it were, *B* being the winding of a back contact relay, while *A* is the winding of make contact relay. When a party calls in the usual manner, the operator would insert the plug, which would put relay *A* in series with cut-off relay *C O R*. Both would be energized, *C O R* cutting off line signalling apparatus, and connecting the multiple to the line, while relay *A* closed the circuit of the supervisory lamp. As the receiver is supposed to be off the hook, *B* is energized, and the lamp circuit broken.

The test feature is a distinctive one, consisting of a 5,000-ohm relay, which armature contacts, when closed, put a ground on the primary circuit in such a manner as to cause a battery flow through the primary winding, and induce a current in the secondary. Being of a great number of turns, and highly inductive, it does not cause an appreciable reduction of the terminal potential, and only an experienced telephone user can detect the test made on his line. The testing relay serves the entire operator's position, and is necessarily disassociated from each talking connection. Relay *D*, acting in series with the cut-off relay, *C' O' R'*, serves this purpose, and also closes the talking circuit, and the supervisory lamp circuit also. When the subscriber answers, relay *C*, has a function likened to relay *B*, simply opening the supervisory lamp circuit.

Condensers connect the answering and calling circuits instead of repeating coils, and serve to repeat the fluctuating voice currents. The circuits are individualized by the relays, which also control the direct-current supply as well. The circuits in Figs. 5 and 6 bear a very close resemblance to each other, having the same features practically; first, the temporary energization of the cut-off relay during the act of ringing; second, the current of cut-off relay energization being supplied over the strands of the talking circuit; and, third, the combined use of the sleeve as a testing and talking terminal.

Both systems have a normally disconnected multiple jack, a normally connected line-signalling apparatus; are designed for metallic service only, and it may be said that the four years' effort of the brainiest, cleverest and most experienced telephone engineers ever assembled together in the employment of one company simply resulted in the removal of the ground from the subscriber's station to that of the ground at the exchange cut-off relay terminal, which fact strongly proves the genius of the inventor of the first double supervisory two-strand telephone system.

When one remembers the herculean difficulties confronting this and other groups of Independent telephone engineers, the limited experience of the past, working in an entirely new field of action, one cannot help but realize that this apparently simple transfer of grounds represents many mile-posts in the advance of telephone development.

QUERIES

Questions on any subject relating to telephony will be answered on this page.

EXTENSION INSTRUMENT TROUBLE.—(427.)

We have a main and extension instrument connected as shown in the diagram, so that when the main instrument is in use the line to the extension is opened at the hook switch. Why is it that portions of the conversation can be overheard at the extension when the main instrument is in use?

A. D.

With the arrangement shown the line to the extension is

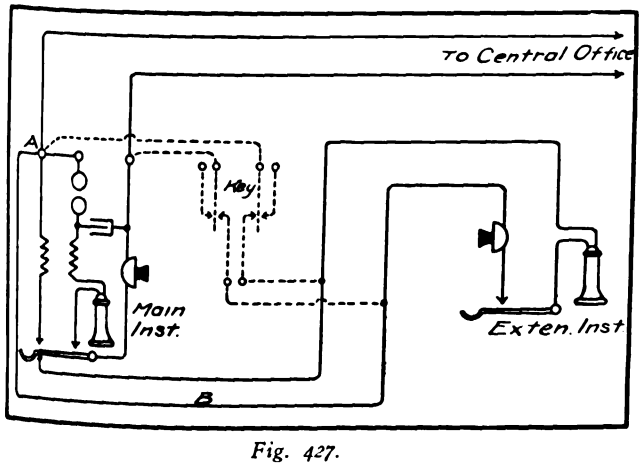

Fig. 427.

opened on one side only when the main instrument is in use, and the effect at the extension is due to the variations in the electrostatic charge on the side of the line which is not opened. If a source of electromotive force is connected to a wire which is open a current will flow from the source into the wire and charge it, the amount of charge depending upon the potential of the source. In the case in question the variation in the resistance of the transmitter at the main instrument causes changes in the value of the current flowing in the line, and consequent changes in the line potential at all points throughout its length, these changes being due to the varying *C R* loss. Thus the potential at the point *A* is constantly varying, and the static charge on the wire leading to the extension varies directly as the potential at *A*, and for this reason there is a continual flow of current in the wire *B*, and the receiver of the extension instrument is effected and the conversation at the main instrument repeated.

This condition can be avoided by connecting the extension through a switching key so that both sides of the line are opened when the key is operated. This arrangement is shown by the dotted lines in the diagram.

TRANSMITTERS.—(428.)

Will you kindly describe to me the difference between a transmitter used in connection with the local battery system and one used on the common battery system? Can a local battery transmitter be used by a common battery line?

B. J.

With reference to transmission the point of distinction between a local and common battery telephone lies in the fact that in the case of the latter, the transmitter being in series with the line, the resistance of the transmitter circuit is higher than that of the local battery telephone, so that in order to make the variation as great as possible, the resistance of the transmitter must be made high. The average resistance of a local battery transmitter is about 10 ohms, while that of the common battery transmitter is about 50 ohms. A local battery transmitter cannot be used on a common battery line, because its low resistance would allow an abnormal flow of current, which would result in "frying" the carbon. A common battery transmitter can, however, be used with a fair degree of success on a local battery telephone.

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THE WEEK'S MESSAGES

FINANCIAL.

MONROEVILLE, IND.—The Monroeville Home Telephone Company has increased its capital stock from $25,000 to $75,000. S. E. Mentzer is the president of the company.

JACKSON, MISS.—The West Point Telephone and Telegraph Company's annual report gives its gross receipts at $4,174.59, while its expenses are given as $2,878.92.

WAVERLY, MO.—The Waverly Telephone Company has increased its capital stock from $35,000 to $50,000.

OCEAN PARK, CAL.—The Home Telephone Company has asked for a franchise in this city.

POMONA, CAL.—ThePomona Valley Telephone and Telegraph Company has paid its first semi-annual dividend on an eight per cent. basis. The company is composed of 150 stockholders and has at present 750 telephones in use.

FRANCHISES.

SAN BERNARDINO, CAL.—The San Bernardino County Supervisors have accepted the bid of Frank B. Daley, representing Nathan W. Tarr, for a telephone franchise along the county highways running into San Bernardino.

ALTON, ILL.—The city council has granted a franchise to the Fosterburg Telephone Company.

TURNER, KAN.—The Independent Telephone Company of this city, which is under the management of W. A. Strickland, will ask the city of Argentine for a franchise.

OLD TOWN, ME.—The city clerk reports that the Bangor Automatic Telephone Company has accepted the terms of the franchise for operating in this town.

FREMONT, NEB.—The Fremont Telephone Company has been granted a franchise to do business in this city.

VENTNOR, N. J.—The Atlantic Coast Telephone Company will ask the city council for a franchise to lay an underground telephone line in this city. The company proposes to lay all of its wires in conduits.

ONEIDA, N. Y.—The Rome Telephone Company has been granted a franchise in this town.

CINCINNATI, OHIO.—The Queen City Telephone Company has asked for a franchise at Locland.

COLUMBUS, OHIO.—At a meeting of the directors of the Columbus Citizens' Telephone Company it was decided to issue $300,000 worth of six per cent. preferred stock, the proceeds to be used in making the needed improvements.

LEXINGTON, VA.—The Lexington Town Council has granted a franchise to the Lexington Telephone Company for a period of thirty years for a consideration of $75. The company will at once enlarge the plant at a cost of about $5,000.

GREEN BAY, WIS.—A committee on ordinance will favorably report to the common council the application of the Valley Telephone and Telegraph Company for a franchise in this city.

COMBINATIONS.

AUGUSTSA, ARK.—The M. H. Patterson Telephone Company, of Augusta, has purchased the plant of the Clarendon Telephone Company, of Clarendon.

JACKSONVILLE, GA.—All of the property of the Jacksonville Telephone Company has been bought by G. K. Gerow for the sum of $5,000.

NASHVILLE, ILL.—The Southern Union Telephone Company of this city has disposed of all its lines in Coulterville to the Coulterville Telephone Company. The new company has organized, with the following officers: J. I. Higgs, president; C. N. Laubenheim, secretary; R. M. Burns, treasurer. The line will be extended to Marissa.

BALDWINSVILLE, N. Y.—A mortgage by the Baldwinsville Telephone Company to the Empire Trust Company of New York City has been given for $30,000. William H. Tappan is president of the company and James K. Whittaker treasurer and secretary.

COMANCHE, TEX.—J. P. Wilkinson has purchased the entire business of the Comanche Telephone Company.

NEW COMPANY NOTES.

TALUCAH, ALA.—The Intercounty Telephone Company, of Talucah, has been incorporated with a capital stock of $2,000. The incorporators are: C. L. Hogeboon, C. B. Hogeboon, Gus May, A. M. Llewellen, H. C. SiSmpson, J. B. Crowder, E. K. Cerrie, William Stringer, Cal Johnson, R. D. Cherrie, E. T. Giers and G. D. Campbell.

CORDELE, GA.—The Farmers' and Business Men's Telephone Company has been organized, and has been granted a franchise to do business in the city of Cordele. J. C. Ledbetter is president.

YORKTOWN, ILL.—The Yorktown Telephone Company has been organized with the following directors: George Matthis, M. R. Thackeberry, George Burden, P. S. Johnson and R. B. Senseny. The company will be incorporated with a capital stock of $5,000, and is a consolidation of the Yorktown-Hoopole and the Dingley-Thomas-New Bedford lines.

SCOTTSVILLE, KY.—The Scottsville & Barren River Telephone Company has been incorporated with a capital stock of $125, by W. B. Ray, R. F. Hood and J. T. Hunt, of Scottsville.

OAKLAND, MD.—The farmers in the southern section of this county and the adjoining territory of West Virginia have organized a mutual telephone company to be known as the Red House Telephone Company of Garrett County. Its lines will extend to the line of the West Virginia Central Railroad, and cover the southern section of this county. Henry Sisler is president, Mr. Arnold, vice-president, and P. F. Snyder, secretary. The company already has some lines in operation and will add more as they are needed.

GRAND LEDGE, MICH.—The Grand Ledge Telephone Company has been incorporated with a capital stock of $10,000. The officers are: Clark Smith, president; W. H. Sutherland, secretary, and Daniel Shadduck, treasurer. Austin Shipman and D. G. Kennedy, together with the president and secretary, constitute the board of directors.

HANOVER CENTER, N. H.—The Hanover Center Telephone Company has been incorporated with a capital stock of $1,000.

ALMA, N. Y.—The Alma Telephone Company has been organized with the following officers: E. J. Richardson, president; N. I. Strait, secretary and treasurer; W. H. Dunn, W. O. Watson, R. R. Gowdy, S. R. Branes and Lewis Perry, directors.

CANASTOTA, N. Y.—The Canastota Telephone Company has been incorporated with a capital stock of $25,000. The directors are C. J. Wood and T. H. Ferris, of Utica, and J. W. Souter, of Canastota.

KITCHAWAN, N. Y.—The Kitchawan Telephone Company has been incorporated with a capital stock of $1,000. The directors are: B. L. Chadeayne, E. G. Von Pim and H. B. Forman.

BOLIVAR, OHIO.—The Tuscarawas Valley Telephone Company, of Bolivar, has been incoroporated with a capital stock of $2,000, by Earl D. Fisher, John W. Keel, C. J. Pfau, S. B. Hennis and H. L. Fisher.

JUNCTION CITY, OHIO.—The Rush Creek Telephone Company, of Junction City, has been incorporated with a capital stock of $5,000, by W. G. Tuttle, W. M. Klinget, J. M. Elder, Joseph M. Folk and B. C. Elder.

NEWCASTLE, OHIO.—The Newcastle Telephone Company has been incorporated with a capital stock of $3,000, by J. W. Dillon, Abe Horn, W. L. Berry, W. C. Wilson and W. S. Crater.

NORMAN, OKLA.—The Farmers' Central Telephone Company, of Norman, has been incorporated with a capital stock of $5,000, by G. E. Fuller and J. W. Abshier, of Franklin, and J. P. M. Haun, of Norman.

BEND, ORE.—The Deschutes Telephone Company has been incorporated with a capital stock of $3,000 and bonds $3,000, to operate telephone systems in the towns of Bend and Prenville. The officers are: W. E. Guerin, Jr., president and manager; A. L. Goodwillie, vice-president and treasurer; V. J. O'Connor, secretary.

BUTLER, PA.—The Pittsburgh-Butler Telephone Company has been incorporated with a capital stock of $25,000. Treasurer, T. J. Shufflin, Butler. Directors: J. G. Splane, J. S. Weller, Pittsburgh; T. J. Shufflin, Butler.

COUDERSPORT, PA.—The Allegheny Valley Telephone Company, of Coudersport, has been incorporated with a capital stock of $5,000.

EDINBORO, PA.—The Edinboro Telephone Company has been incorporated with a capital stock of $6,000. Treasurer, G. W. Minium, Edinboro. Directors: J. F. Bigler, C. L. Darrow, Fred Le Seur, E. P. Perry, I. R. Reeder, W. A. Proud, G. W. Minium, Edinboro.

ERIE, PA.—The Union Telephone Company, of Erie, has been incorporated with a capital stock of $10,000. Treasurer, W. B. Barnard, Philadelphia. Directors: Wm. B. Trask, W. H. Wilson, James Russell, Erie; W. B. Barnard, Philadelphia; Ellis L. Orvis, Bellefonte.

HERNDON, PA.—The Mahoney-Mahantango Telephone Company, of Herndon, has been incorporated with a capital stock of $20,000.

MAHANOY, Pa.—The Mahanoy & Mahantango Telephone Company has been incorporated with a capital stock of $20,000. Treasurer, I. B. Tressler, Mahanoy. Directors: Chas. Fritz, Treverton; David Wilhour, Mandata; E. R. Reitz, Rebuck; E. S. Stroub, Herndon; I. B. Tressler, Mahanoy; E. W. Dockey, Pillow; John Tressler, Urban; W. C. Leitzel, Klingerstown; C. R. Kehler, J. E. Kehler, Kehler; J. F. Brosius, Dalmantia; W. P. Zartman, Dornsife.

PITTSBURGH, PA.—The Allegheny Valley Telephone Company has been incorporated with a capital stock of $5,000. Treasurer, A. C. Boerner, Coudersport. Directors: A. C. Boerner, F. A. Stebbins, Fred. C. Leonard, C. A. Stebbins, A. F. Woods, Coudersport.

STAFFORD COURT HOUSE, VA.—The Toluca & Fredericksburg Telephone Company has been incorporated with a capital stock of from $1,500 to $5,000. The incorporators are: R. A. Moncure, Hugh Adie, T. G. Waller, T. J. Moore and Wesley Knight.

PINE CITY, WASH.—The Interstate Telephone and Telegraph Company has filed articles of incorporation with a capital stock of $5,000. The officers are as follows: J. J. Stephens, of Thornton, president; Nelson Howard, of Thornton, treasurer, and Dr. T. A. Swain, of Pine City, secretary and general manager.

UNION GROVE, WIS.—The Union Grove and Paris Telephone Company has been incorporated with a capital stock of $2,000 by the following: Henry Baens, O. T. Graham and C. E. Bartholfe.

PERSONAL.

E. D. CHILDRESS, foreman at Clinton, Ill., for the Farm & City Telephone Company for three years, has been promoted to manager of the Farmer City district.

WILFORD CONLEY has been appointed manager of the local company at West Bend, Iowa.

G. L. STERNS has been elected general manager of the Enterprise Telephone Company at Piperstone, Minn.

H. G. SLATER has been appointed by the Citizens' Telephone Company, Oshkosh, Wis., manager for the ensuing year. Mr. Slater now has charge of the Independent exchange at New London, Weyauwega, Waupaca and Sheridan and connecting toll lines.

R. B. WATSON has been appointed manager for the Michigan State Telephone Company at Detroit, succeeding G. S. Johnson, who will take another position.

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MISCELLANEOUS.

DIXON, ILL.—The Lee County Telephone Company will move into larger quarters and will construct an underground system.

SPRINGFIELD, ILL.—The Illinois Central Railroad has completed its telephone line between Clinton and Springfield.

ATTICA, IND.—A new switchboard is being installed at West Lebanon.

SOUTH BEND, IND.—The forthcoming supplementary directory of the South Bend Home Telephone Company will show 300 new subscribers in the city and county.

SOUTH BEND, IND.—The last shipment of cables for the $30,000 contract for extensions has been received and will be installed as rapidly as possible. It has been delayed by fire in the factory.

SIOUX CITY, IOWA.—The Payette Construction Company, of Sioux City, has secured the contract for the erection of the Sioux City Telephone Company building at $19,419.

LEXINGTON, KY.—The Fayette Home Telephone Company has recently built a toll line to Georgetown, Ky., and also reconstructed its exchanges at Midway and Versailles, making them metallic, with long distance instruments.

BOSTON, MASS.—The July instrument statement of the American Telephone and Telegraph Company shows total of instruments in use of 2,080,758.

CAMBRIDGE, MINN.—The Twin City Telephone Company's exchange in this town was damaged by lightning recently.

LAKE BENTON, MINN.—Permits have been granted the Lincoln County Telephone Company to build and operate exchanges at Hendricks and Ivanhoe, and to build toll lines between those points. Construction will be started at once.

GEORGETOWN, N. D.—The Red River Telephone Company has connected with the local system giving service to Moorehead and Fargo.

HOOSICK FALLS, N. Y.—Plans have been prepared for the new Automatic Telephone Exchange building. The building will be of brick, two stories in height with basement, and will occupy a ground space of twenty-two by sixty-eight feet.

CINCINNATI, OHIO.—The subscribers in Elmwood Place, St. Bernard and Carthage are rebelling against a new rate schedule enforced by the Cincinnati & Suburban Telephone Company.

McCONNELLSVILLE, OHIO.—The new directory of the Home Telephone Company shows a total of 986 subscribers in McConnellsville and the surrounding country.

CENTER HALL, PA.—The organization of a local telephone company is assured in Union County. The patrons will have the use of the territory covered by Union County and Milton, with a five-cent rate to Sunbury over the Bell lines.

PITTSBURG, PA.—Street-car telephones, over which crews or passengers may converse at any point reached by telephone, were installed on the Charleroi division of the Pittsburg Railway Company recently.

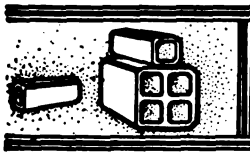
RACINE, WIS.—The Badger Telephone Company has secured right of way for a long distance line from here to the Mississippi near Monroe.

UNDERGROUND.

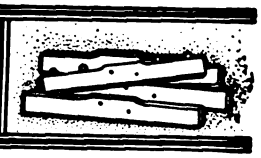
CARTHAGE, MO.—The Home Telephone Company is putting some of its wires underground.

BINGHAMTON, N. Y.—The York State Telephone Company is constructing an underground conduit system in this city.

NEWBURGH, N. Y.—The Colonial Telephone Company will lay 16,700 feet of new underground cable, some of which is 400-pair.



New Construction in the Field



TUSCON, ARIZ.—C. W. Hinchcliffe, of Tuscon, manager of the Arizona Telephone Company, is seeking to extend his telephone line to San Diego, Cal., and will probably purchase the system owned by W. F. Holt, of San Diego.

SOUTH McALESTER, I. T.—The Schooler Brothers' Telephone Company will begin the construction of a new telephone system in South McAlester in the near future. The system will cost $50,000, and will be built on the conduit underground system.

DES MOINES, IOWA.—The Mutual Telephone Company is installing a new switchboard in its new building. This work will be completed by November 1st.

GIBSLAND, LA.—The North Louisiana Telephone and Telegraph Company has received a carload of wire to be used in the construction of a metallic circuit telephone line between here and McNeil, Ark., and Natchitoches.

PADUCAH, KY.—The People's Independent Telephone Company is preparing to extend construction on local exchange at Salem and will construct several new lines.

PRESQUE ISLE, ME.—The Arrostook Farmers' Telephone Company will build a line to Mapleton and Castle Hill, and extend lines to Fort Fairfield and Caribou.

BOTTINEAU, MINN.—A rural line is to be run fourteen miles into the country, southeast from here.

BRICELYN, MINN.—The Bricelyn Mutual Telephone Company is extending its system to connect with the farmers' lines in the surrounding country.

MALACA, MINN.—A telephone line will be built from this town to Mille Lacs Lake.

KANSAS CITY, MO.—The Missouri & Kansas Telephone Company has just ordered fifty tons of copper wire and two new switchboards, and will spend something like $130,000 in reconstructing its exchange in St. Joseph.

LAMONTE, MO.—A number of citizens of Lamonte held a meeting recently to discuss plans for the organization of a local telephone company for operating both city and rural telephones, with central office located in Lamonte. As a result of the meeting a new company will be formed with a capital of $10,000.

MIAMI, MO.—The Saline County Telephone Company proposes to reconstruct its exchange in this city.

HASTINGS, NEB.—The Hastings Independent Telephone Company is making preparations to erect a $10,000 brick building. The work of excavating will be started within a few weeks. The building will be erected expressly for the Independent Telephone Company.

ST. JOHNS, N. B.—The Central Telephone Company has purchased the St. Martins Telephone Company. It is now erecting an extension through part of Kings County and the company, it is expected, will soon make application to the city council of St. Johns for a local franchise.

BLAIRSTOWN, N. J.—A company is being formed to build a telephone line from Blairstown to Flatrockville across Pahaquarry township.

RIVERSIDE, N. J.—The Standard Telephone Company, of Philadelphia, it is said will spend $5,000 in Riverside improving the exchange.

EDMESTON, N. Y.—The Wharton Valley Telephone Company is making preparations to extend its line down the valley to New Berlin.

HAMBURG, N. Y.—The Frontier Telephone Company completed its line to Eden recently, and the Eden Telephone Company is now utilizing its lines to connect with Buffalo and adjoining towns. The Eden Company has upwards of eighty patrons, which extends through Eden Valley. The Inter-Ocean Telephone Company is now building a line to North Collins and Langford, which will be completed within a fortnight.

WHITNEY'S POINT, N. Y.—The Centre Lisle Telephone Company is building two new lines.

FARGO, N. D.—The Red River Telephone Company is pushing the work of extending their lines in Clay and Cass counties. The telephones at Georgetown were connected with the system recently, and that village can now be reached by all subscribers in Fargo and Moorhead.

DOYLESTOWN, PA.—The Standard Telephone Company has opened a new direct line to Philadelphia. A new switchboard is being built, and when installed will give the subscribers of Doylestown as good service as any.

JOANNA, PA.—The Conestoga Telephone Company, at a meeting held recently, decided on a new switchboard for the Joanna exchange.

JOHNSTOWN, PA.—The Economy Telephone Company, an organization of farmers living in Elklick, Greenville, Larimer, Summit and Brothersvalley townships, will establish an exchange in Somerset.

NEW HOLLAND, PA.—The Enterprise Telephone Company will move its exchange into larger quarters. A new switchboard will be installed, also some aerial cable in the business part of the city.

BRINTON, S. D.—The Social Telephone Line, of Newark, is to run in a line and establish an exchange here.

SHERMAN, TEX.—A. L. Hills, district superintendent of the Phœnix Telephone Company, with headquarters at Houston, has perfected arrangements for the extension of the company's line from Bonham to Sherman, connecting with Dennison through the Grayson County Telephone Company's lines. It is the intention of the company to extend the line a little later from Bells to McKinney.

BELLINGHAM, WASH.—The lines of the British-Columbia Telephone Company from Bellingham to Vancouver Island are all completed with the exception of laying the submarine cable.

SEATTLE, WASH.—The Independent Telephone Company has connected its lines with Vishon Island and will have the line in service by October 1st. This line will give Seattle long distance connection with all the places in the vicinity.

TRADE NOTES

THE T. AND A. SELECTIVE CALL COMPANY, of Geneseo, Ill., has moved into much larger quarters, which became necessary on account of the larger orders on hand. It hopes to be able to keep up with them now, and will use every effort to that purpose.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY has received a contract for constructing the entire plant for the Holley Telephone Company, in Holley, N. Y., including all apparatus for a common battery system. The company also reports an exceptionally busy summer, especially in its telephones equipped with the new Century Platinum Transmitter.

THE WILLIAMS TELEPHONE AND SUPPLY COMPANY, of Cleveland, Ohio, reports a decided improvement in trade conditions during the past month. Its recent removal into new and better quarters, with equipment which enables it to turn out the very best quality of goods in the least possible time, is already beginning to bear fruit.

F. B. COOK, of 240 W. Lake street, Chicago, Ill., has placed on the market a type of guy clamp that has several points of merit. This clamp is known as the "Universal," and is claimed by the manufacturer to be the strongest, simplest and cheapest made. It is manufactured in three sizes, for one, two and three bolts, and fits all sizes of strands commonly used, from three-sixteenths to one-half inch. Sizes larger than one-half inch are special.

W. N. MATTHEWS & BRO., Carleton Building, St. Louis, Mo., are distributing a novel folder entitled "Burial Expenses." This folder deals with the Stombaugh Guy Anchor, of which this company is the sole distributor. The circular states that the expenses of burying a "dead man" has prevented many a man from properly guying poles, fences, etc. The funeral expenses of the Stombaugh guy anchor are so small that the same men are burying them, because they know they will hold better than the "dead man." The circular includes descriptive matter and price lists and will be forwarded to all interested upon request.

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THE AMERICAN CONDUIT COMPANY, Manhattan Building, Chicago, has just been awarded the contract by the electrical commission of Baltimore for a quarter of a million feet of bituminized fiber conduit. This contract was awarded after a series of exhaustive tests and investigations, which forms another important link in the chain of evidence favorable to bituminized fiber conduit for underground construction.

THE BAIRD MANUFACTURING COMPANY, of Chicago, is pushing the sale of its portable restaurant pay-stations, which are finding great favor among large telephone companies. A business man can, during lunch, call up his office or attend to other business matters with the greatest ease. The sale for this class of instrument is constantly increasing.

THE STERLING ELECTRIC COMPANY, of Lafayette, Ind., reports that its four-party selective equipment is gaining popularity daily. It has just completed shipments to Springville, N. Y.; Cooperstown, N. Y.; Meadville, Pa.; Warren, Pa.; Conneaut, Pa.; Cedar Rapids, Iowa; Chillicothe, Ohio; Louisiana, Mo.; Pittsburg, Kansas; Hudson, N. Y., and Lorain, Ohio.

THE AMERICAN STEEL AND WIRE COMPANY, of Chicago, San Francisco, New York, Denver and Worcester, has issued a price list of steel and copper wire on spools. This type of wire is made in all gauges from 16 to 36, and steel hair wire from 24 to 38 gauge. The steel wire is made up both bright and tinned annealed. The prices are per dozen spools, the spools being quarter, half and one-pound and one-ounce capacity.

HUBBARD AND CO., of Pittsburgh, Pa., wish to call the attention of the trade to its all-iron pole seats. These seats are made in the most substantial manner, the rim and braces being of angle iron, and the cross bars of stiff steel, solidly riveted to the rim. They are finished either japanned or black. Prices upon application. This firm also manufactures braces, pole steps, anchor rods, etc.

THE S. H. COUCH CO., of Boston, reports a steady demand for its No. 12 type of telephone. This set particularly pleases the construction man, as it is designed so as to make connecting a pleasure. Bulletin 6 explains in detail, free upon application.

THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Building, Chicago, reports a good August business. Its factory in Chicago has been running a night force to keep up with the demand for controllers. A large shipment has just been made to the Kinlock Telephone Company for use on the World's Fair grounds, in addition to those that have been doing heavy service all this summer.

THE F. BISSELL COMPANY, Toledo, Ohio, reports an increased demand for its "Security" conduit rods. These conduit rods were recently put through some very severe tests by the Home Telephone Company, Toledo, Ohio, and the results were highly gratifying to the manufacturers. Besides being low in price, they possess qualities which make them the most desirable rods on the market. Light in weight, quickly jointed and unjointed, without slack at joints, yet rigid, and will not buckle or jam under pressure. Made in thirty-six and forty-eight-inch lengths; special lengths to order.

THE BAIRD MANUFACTURING COMPANY, 4 Michigan street, Chicago, maker of Baird Telephone Pay Stations, has brought out a new "Permanent Adjustment Transmitter Arm" which has merits of its own. As indicated by its name, the friction bearing will never require adjustment, either by the telephone assembler or patron of the telephone company. There are no nickeled parts to tarnish, rust or become defaced by adjustment. These arms are beautifully finished and striped, and should find a ready sale.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, of Chicago, has recently installed a complete telephone plant connecting the various towns in central Wisconsin, and offices along the lines of the Green Bay-Kaukauna Interurban Railway System and the Fox River Valley Electric Railway and Power Company, recently built by the Knox Construction Company, Chicago. The telephone plant consists of an "International" self-restoring drop switchboard located at the main offices of the electric company, with long-distance bridging telephones at every branch of the system.

THE NATIONAL TOLL TICKET COMPANY is the new name just adopted by the firm of Gildart Brothers, Albion, Michigan, who have become well known to the telephone fraternity by means of their advertising in the columns of the AMERICAN TELEPHONE JOURNAL. This firm announces that its unanticipated success during the past months in the manufacture and sale of toll tickets and other printed telephone accessories, has convinced them of their right to the name they have chosen, which is printed at the head of this article. The new catalog showing twelve forms of toll tickets, a trouble ticket, and a few other attractive samples, is just out of the press, and may be had for the asking, together with an instructive leaflet, "How to Keep Toll Tickets," written by an operator of experience, which contains some valuable hints on keeping a record of every call, without any great loss of time. The National Toll Ticket is composed of a firm of enterprising young men, who are making a study of the needs of the independent telephone field in their line, and bringing forward some good results. The JOURNAL takes pleasure in introducing them to its readers. See their advertisement on page 16.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED—Position by telephone engineer, capable of taking charge of plant and giving good service to subscribers and dividends to stockholders. Address, F. C. Woods, 665 Wells street, Chicago, Ill. 231

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

WANTED—Good mechanical draughtsman; must be perfectly familiar with telephone work. Address Box 243, AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 243

POSITION wanted by competent telephone man as manager of magneto system. Experience in construction, operating and manufacturing. Best references. Prefers Middle West. Address Box 237, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 237

FIRST-CLASS WIRE CHIEF desires position with large Independent telephone company. Can furnish the best of reference. Address Box 241, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 241

COMPETENT telephone man desires position as manager; can furnish first-class reference as to ability and honesty. Address Box 240, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 240

WANTED—Bright young man of good appearance, who understands thoroughly technical telephony. One who has worked in the field preferred. Must be able to write descriptive booklets on telephone apparatus. Exceptional prospects for the right man. Address Box 242, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 242

POSITION WANTED—As manager or superintendent of telephone company; have had seven years' practical experience in all branches of the business. Address Box 247, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 247

WANTED—Wire chief for central energy exchange in Central Indiana. Must be thoroughly experienced in switchboard work and capable of handling trouble men. Address Box 244, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 244

WANTED—Two experienced telephone inspectors for central energy plant in Central Indiana. Address Box 245, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 245

WANTED—Store-room keeper. Must be capable of repairing all kinds of central energy telephones and keep track of stock. State experience and salary expected. Address Box 246, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 246

POSITION WANTED by a competent telephone man as manager of magneto system. Experienced in construction, operating and manufacturing. Best references. Middle West preferred. Address, Box 237, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 237

WANTED.—At half value, fifty first-class second-hand compact series telephones (magneto) from some independent company that has changed to common battery. Must be from one of the best manufacturers. Address, Box 238, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 238

WANTED TO SELL.—A telephone system operating in eight counties in a western State, with five small exchanges. Good city connections and a first-class investment. Easy terms to the right party. Address, Box 239, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 239

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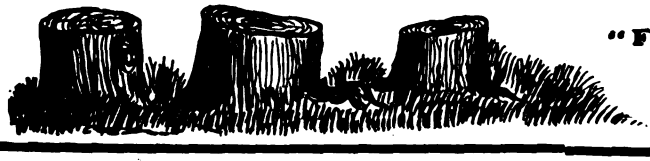
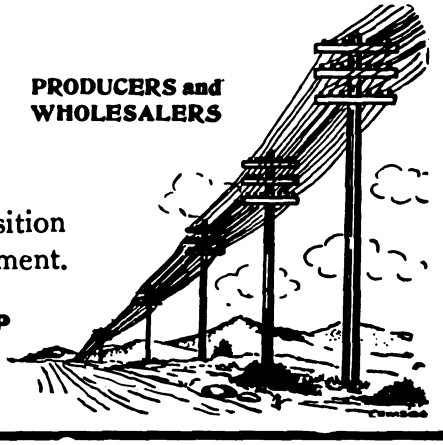


"From the Stump to the Line."



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Thoroughly Seasoned,
Any Length or Size,
Immediate Shipment,
Seven Distributing Yards,
Forty Years Experience.

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WHITE CEDAR POLES

There are several good reasons why you should send us your order for poles. May we tell them?

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BUY YOUR POLES

When you want satisfaction without worry and trouble

OF

The Fowler Companies

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Other Sizes Made to Order

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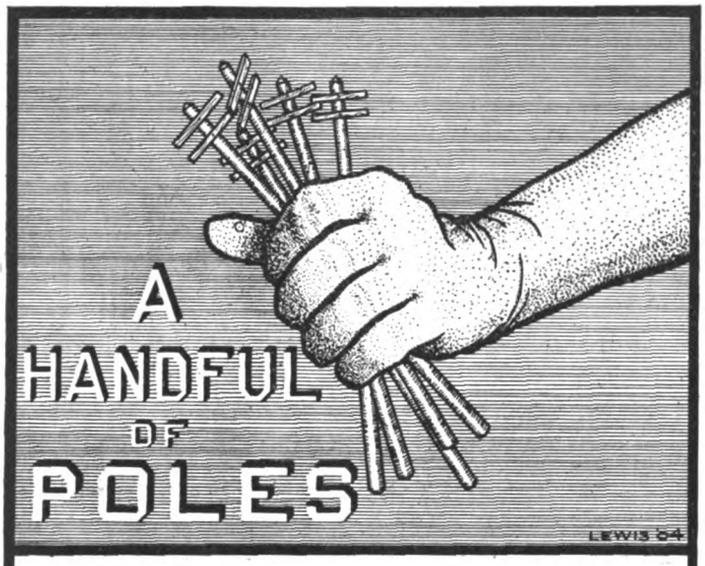

That's about what most dealers keep in stock. We have them by the carload—vast quantities at your service. So we can ship promptly and quote low prices. The Best Poles, too.

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In All Sizes For All Purposes. Large Stocks. Prompt Shipments. Distributing yards at advantageous shipping points.

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SPOKANE, WASH.

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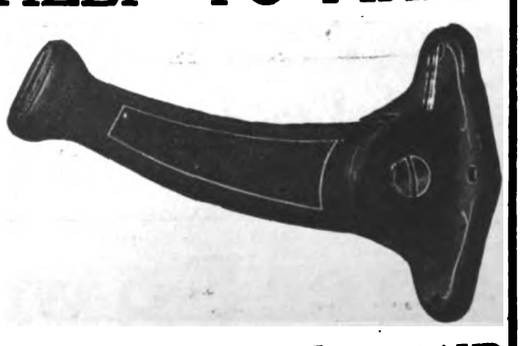
A Good Telephone



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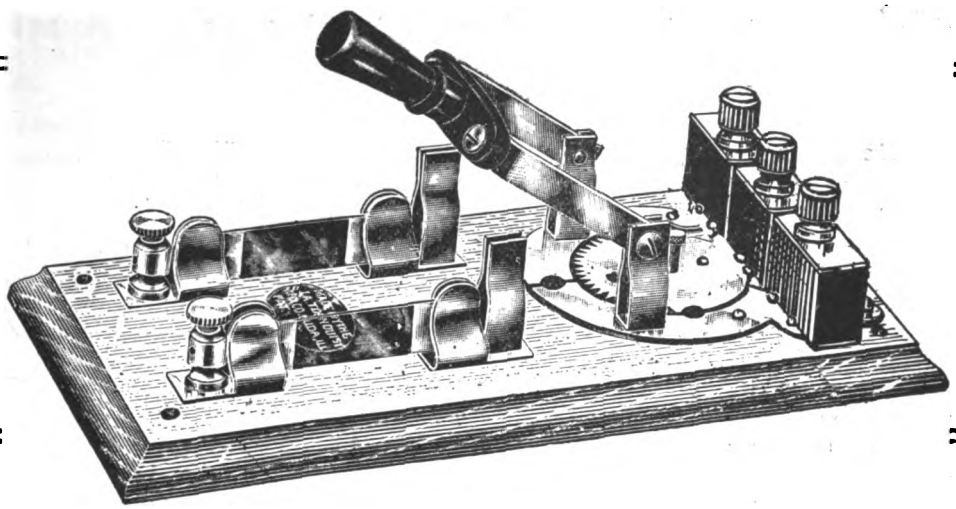
The New "Tornquist" Combination Lightning Arrester, Ground Switch, Fuse and Lever Cut-out



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CONTINUED ON PAGE 47.

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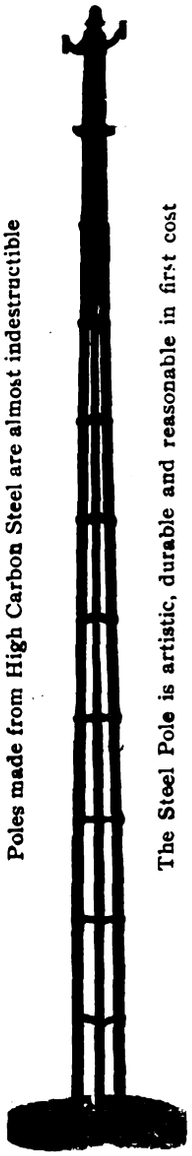

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The Steel Pole is artistic, durable and reasonable in first cost

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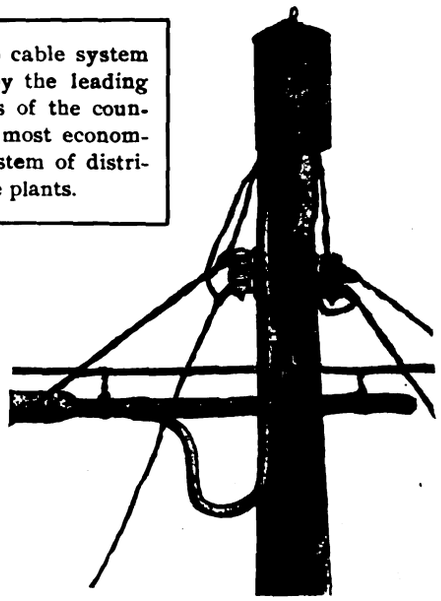
No poles to rot.
No cross arms to rot.
No glass insulators to break.
No crossed wires to interfere with service.
Trees do not interfere.
Sleet storms lose their terror.
No unsightly cross arms and wires on the streets.
No bare wires to break and fall on electric light wire and kill some one passing by.

The multiple tap cable system is acknowledged by the leading telephone engineers of the country to be by far the most economical and durable system of distribution for telephone plants.



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Engineering, constructing and putting plants on a dividend-paying basis a specialty.

There are many serious mistakes made in the selection of apparatus, construction and maintenance of telephone plants due to lack of experience.

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With proper co-operation on part of owners of telephone plants, I will guarantee to make any Telephone Plant pay dividends or increase your present earnings. Can refer you to a number of telephone plants where I have saved thousands of dollars in first cost of the plant, increased the earnings, improved the service, decreased the operating expenses by installing proper apparatus in the proper way and properly organising the working force. Can furnish expert engineer, wire chief, auditor, solicitor, chief operator, each a specialist in his line.

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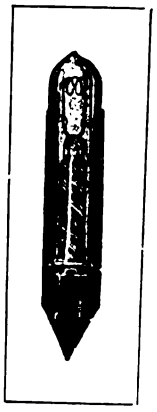
Standard for Visual Signals

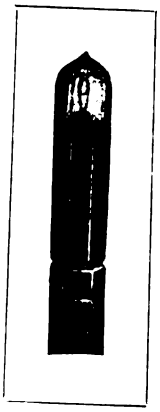


They save the Exchange time and money because Every lamp is perfect—Sure to fit—Sure to burn—The life is extremely long—running into years.

Be sure to get the

EDISON

Orders for any quantity promptly filled.



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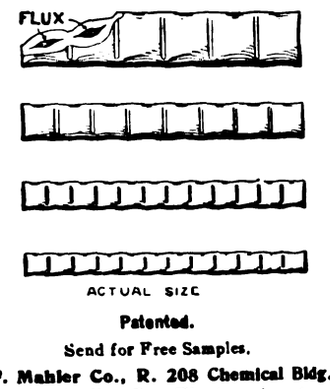

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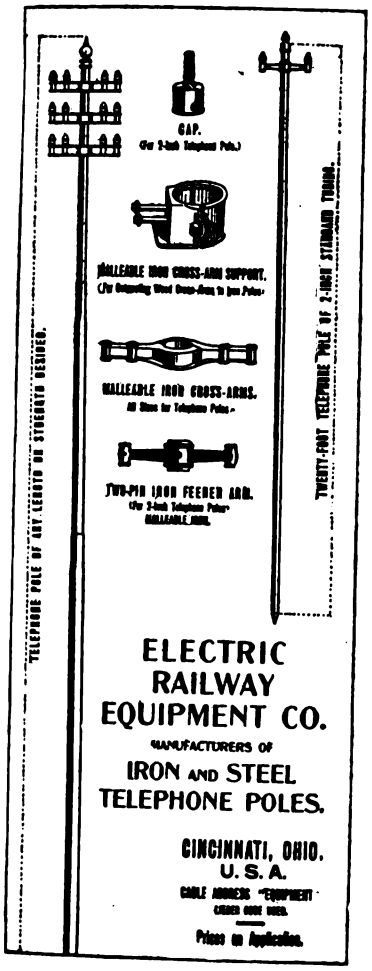

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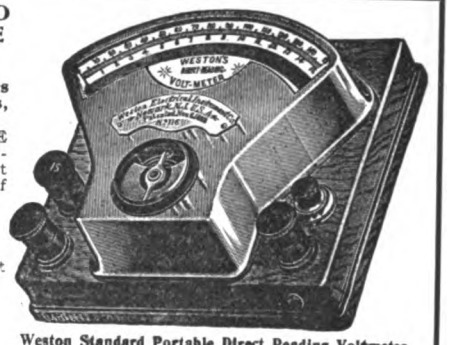

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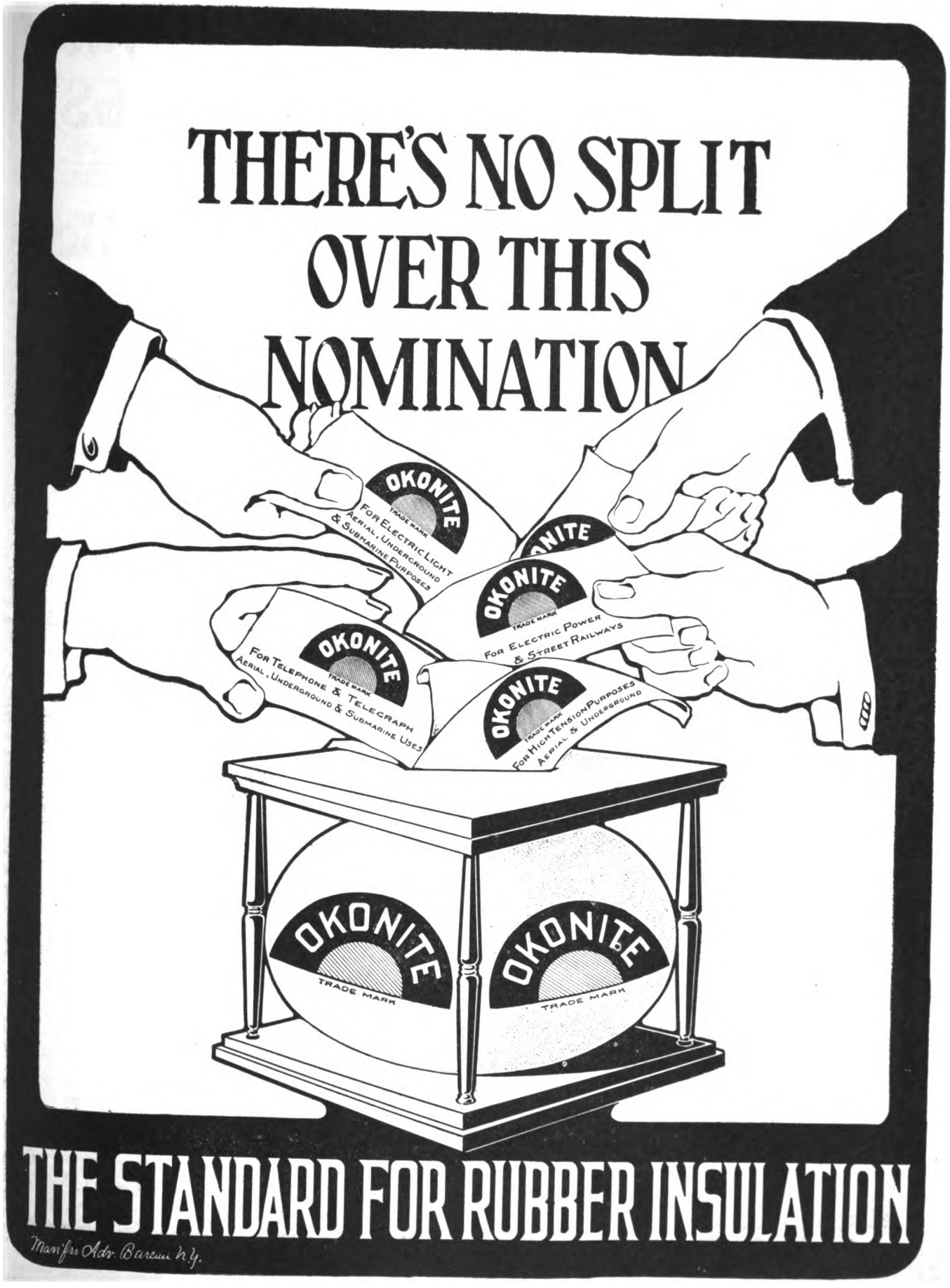

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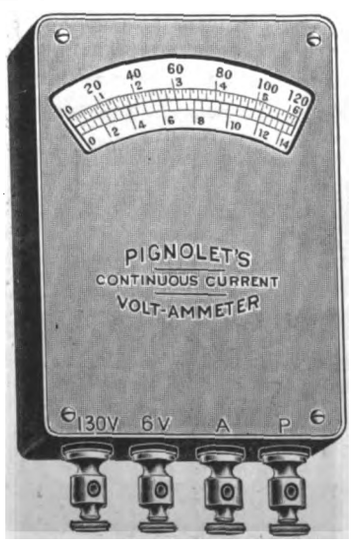

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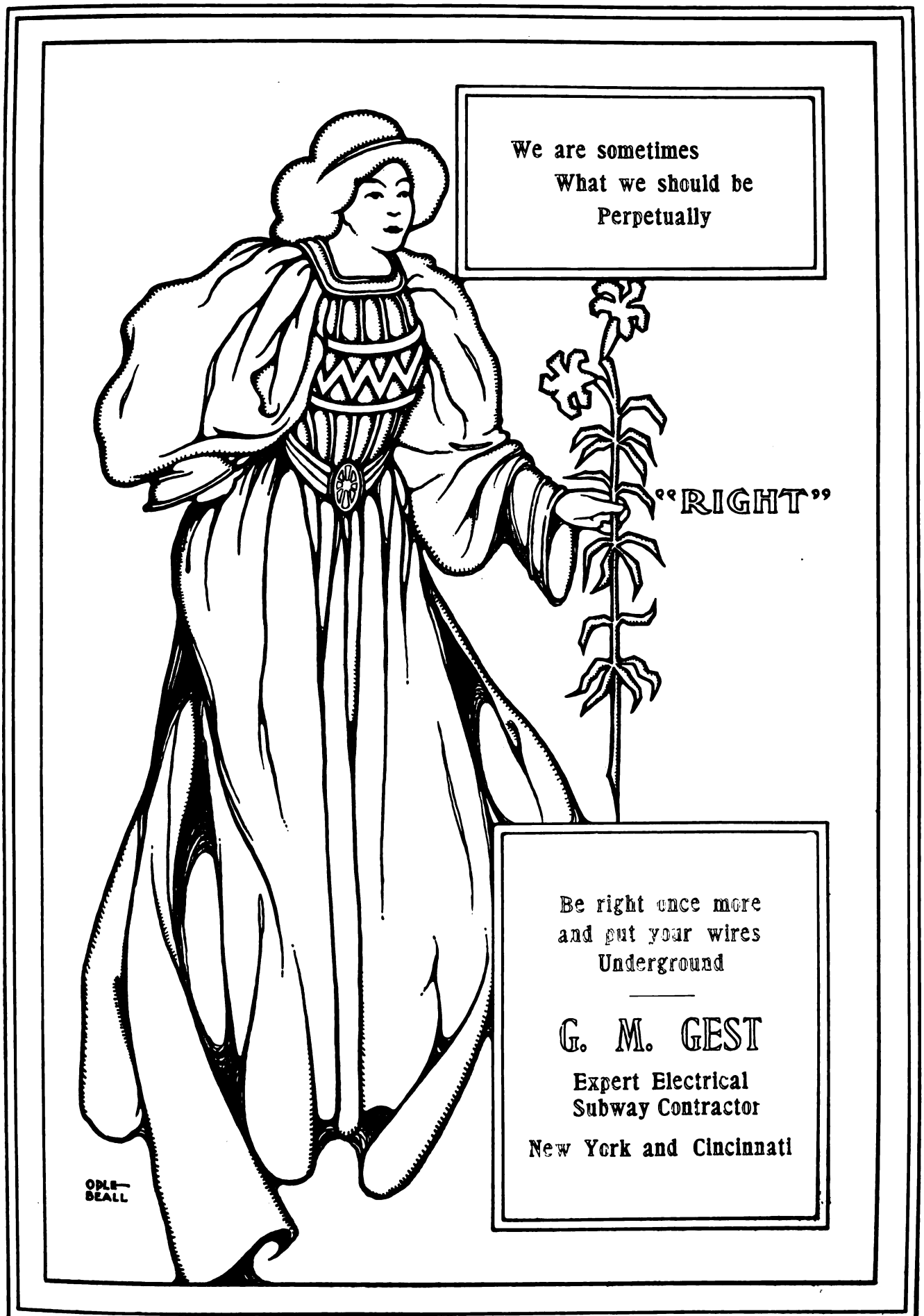

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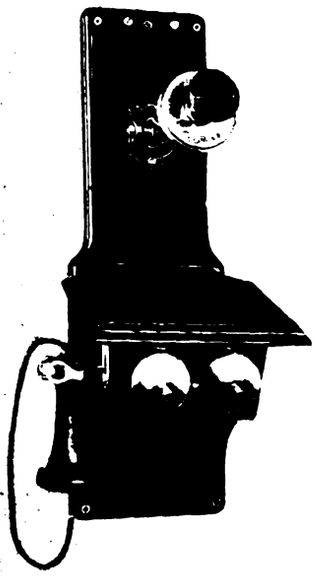

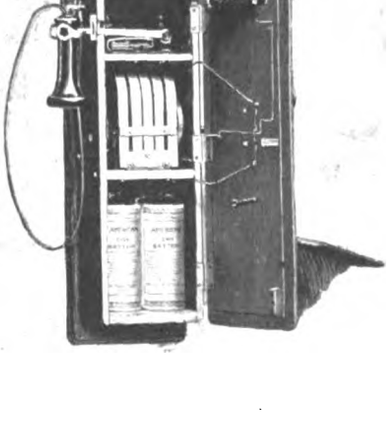

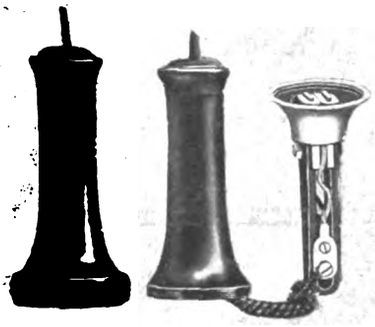

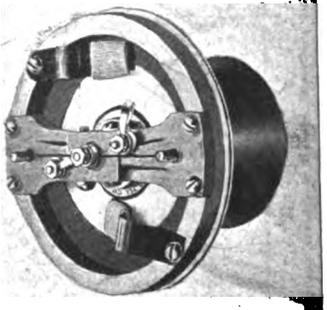

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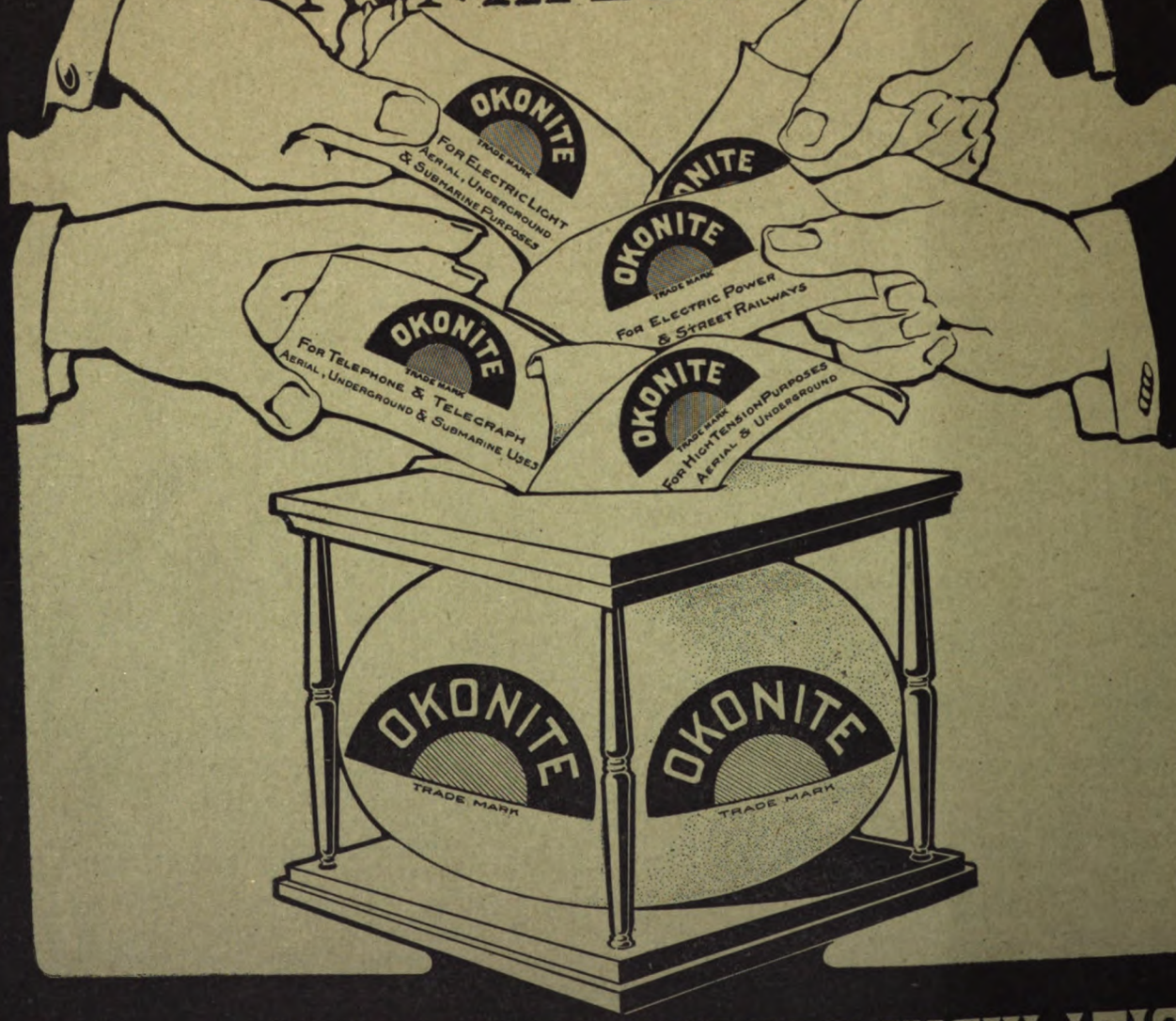

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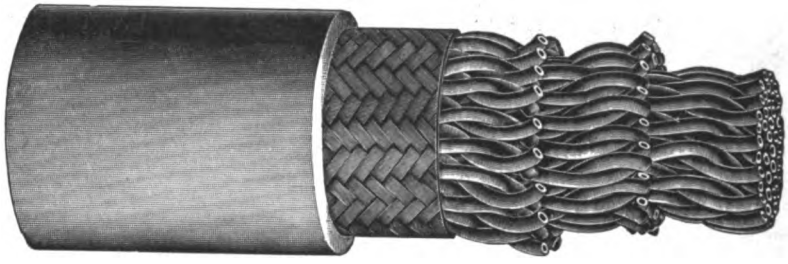

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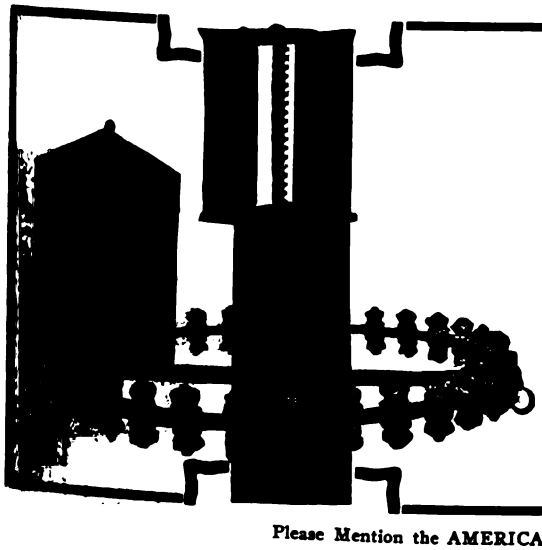

THE HALL TYPE D. CABLE TERMINAL

WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***

Write for Catalogue.

Mountain State Electrical Company,

Sole Manufacturers,

WHEELING, W. VA.

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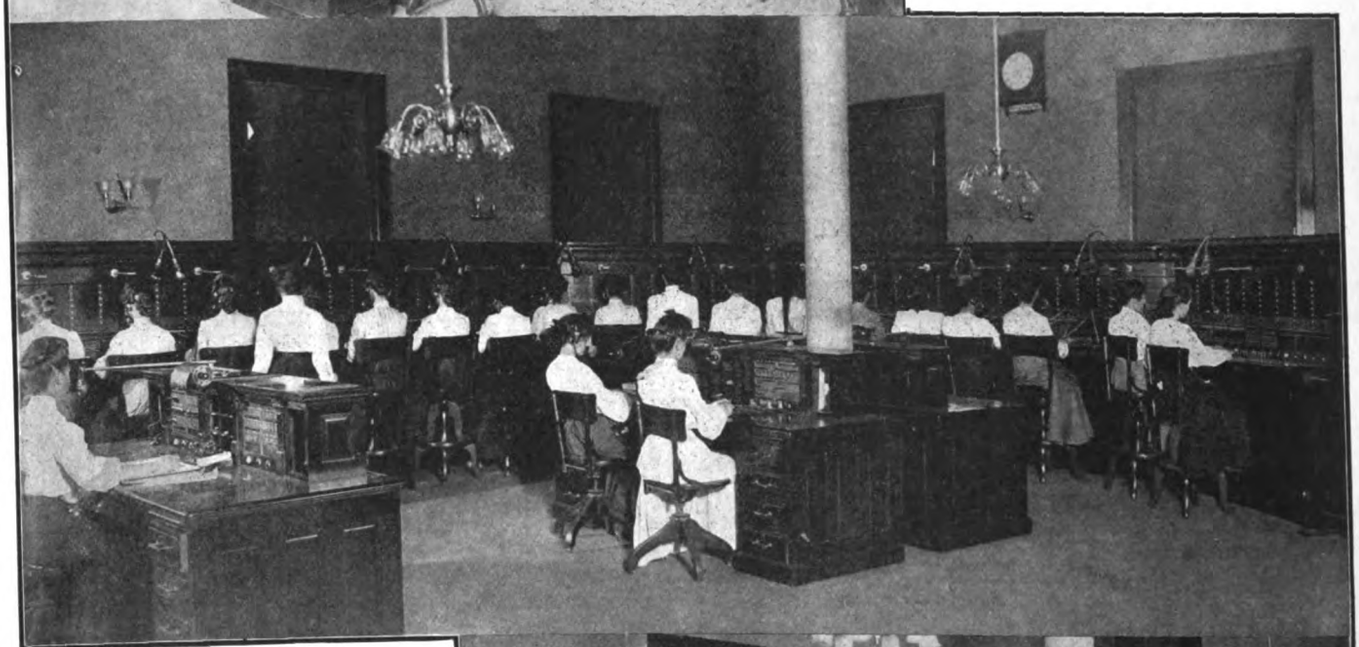
STROMBERG-CARLSON

Apparatus built and installed for the Kansas City Home Telephone Company

The growth of this system in competition with a modern Bell system clearly demonstrates the quality of the apparatus.

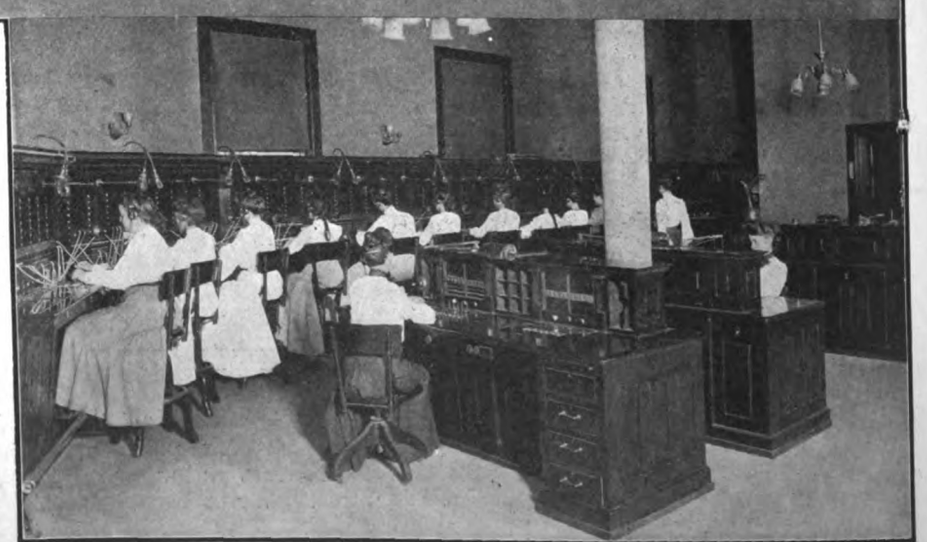
It is of the very best throughout.



Top illustration shows West Office, Branch "C," Kansas City, Kas.

Center illustration shows East Office, Branch "A," Kansas City, Mo.

Lower illustration shows South Office, Branch "B," Kansas City, Mo.



IF INTERESTED IN QUALITY APPARATUS, ADDRESS

Stromberg-Carlson Telephone Mfg. Co.

General and Eastern Sales Office, ROCHESTER, N. Y. Sales Department, CHICAGO, ILL.

Please Mention the AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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We Manufacture LEAD COVERED CABLE

Our factory is equipped with the latest and most improved machinery which enables us to meet the most exacting specifications of the purchaser.

We Manufacture Cable with from 5 to 400 pairs, And Guarantee Satisfaction.

Superior Quality

Prompt Delivery

We Make this Product the same Quality as our Regular Telephone Apparatus.

A majority of the INDEPENDENT Telephone Exchanges have tested its quality in a most practical way --- by using large quantities.

WHEN IN THE MARKET DON'T FAIL TO GET OUR PRICES.

STROMBERG-CARLSON TELEPHONE MFG. CO.

GENERAL OFFICES: *ROCHESTER, N. Y.*

Western Sales Office: *CHICAGO, ILLS.*

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The 1900 Dry Battery

THE most needed quality is reliability. No one wants a battery that will respond all right for a week or ten days then "suddenly go out of business." Another requirement is that it shall continue "strong" during its life. These two requirements besides many others are characteristics of

1900 BATTERIES

We guarantee them not to freeze, leak or break; we warrant them to work with a strong, steady current during their life (anywhere from six to eighteen months).

They are compact, always ready. They are better than wet batteries—no slop, no repairs, no breakage. Any one can replace a worn out one at a moment's notice. They can be carried anywhere—always ready for instant use.

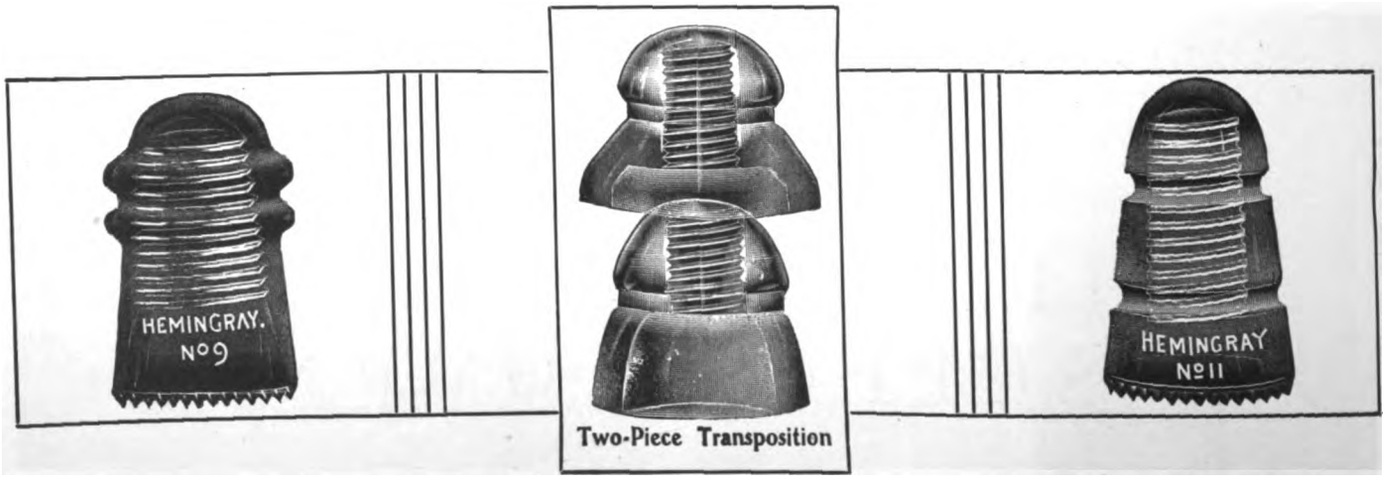
Write us for our Complete List of Batteries and Telephone Supplies

STROMBERG-CARLSON TELEPHONE MFG. CO.

ROCHESTER, N. Y. *CHICAGO, ILL.*

THE STANDARD "HEMINGRAY"

ALL WITH THE "PATENT DRIP PETTICOATS."



Two-Piece Transposition

THE HEMINGRAY-GLASS CO.

Office, Covington, Ky. **Factory, Muncie, Ind.**

ESTABLISHED 1848.

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Kellogg Telephone Apparatus

possesses a distinctive character as well as a most enviable reputation. It is the result of years of study and experience and fulfills every requirement of those who demand the best that can be made.

You cannot afford lower-priced apparatus. Ours is not high priced. The best never is.

Write us for quotations and bulletins.

KELLOGG SWITCHBOARD & SUPPLY COMPANY

LOS ANGELES
Seymour Building

CLEVELAND
Electric Building

PHILADELPHIA
Keystone Telephone Building

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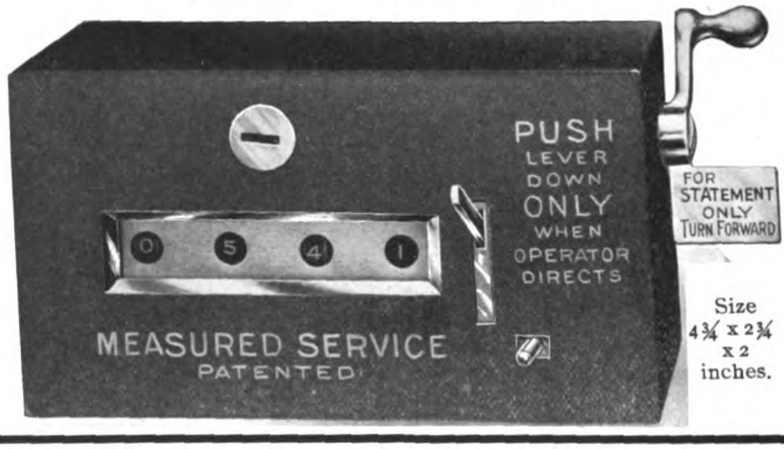
A Labor-Saver and a Patron-Maker

TAKES STATEMENT OVER THE WIRE of Accumulated Calls

Under the Control of Central Office

MOTTO "ECONOMY"



Size 4¾ x 2¾ x 2 inches.

Permits of Credit System to Customer at any Rate per Call.

Measured Service Company

153-159 So. Jefferson Street, CHICAGO, ILL.

The AMERICAN TELEPHONE JOURNAL

NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

Subscription price $1.00 a year, payable in advance; foreign countries $3.00; single copies 10 cents.
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National Independent Telephone Association Convention at St. Louis

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ADDRESS.....By FREDERICK S. DICKSON
HIGH-FREQUENCY TELEPHONE CIRCUIT TESTS.....By DR. A. E. KENNELLY
THEORY OF TELEPHONE EXCHANGE DEVELOPMENT.....By G. De La LOWANNE
SIMULTANEOUS TELEGRAPHY AND TELEPHONY.....By JOSEPH HOLLOS
THE TELEGRAPH, TELEPHONE AND CABLE IN WAR.....By SAMUEL REBER
A NEW DANGER TO LEAD COVERED AERIAL CABLES.....By JOHN HESKETH
WANT AND FOR SALE ADVERTISEMENTS, PAGE 226

Do you like the looks of this Concealed Cord Receiver? You would like the complete Williams Telephone still better, as it carries out the improved methods of construction throughout and always pleases. If interested, write for catalogue and full particulars.

The Williams Telephone & Supply Co.

No. 73 Central Avenue, : : Cleveland, O.

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W. D. CABLE COMPOUND

This compound has all the essential properties of a perfect insulating compound. **High Melting Point. Perfect Insulation.**

Packed, 8 lbs. to pail

SECURE OUR PRICES ON TELEPHONE CABLE

The W. G. NAGEL ELECTRIC CO., Toledo, O.

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Ericsson Four Party Line System

For simplicity, satisfactory service and good results, this system takes the lead. The line is perfectly balanced. Each subscriber is called without a chance of disturbing the others. One party can call central without disturbing the others on the line. Absolutely non-interfering. Extremely simple to install, to maintain and to operate. Few changes or additions necessary at the switchboards. Ask for particulars with prices, etc.

We supply party line telephones for common return or metallic circuits, either two or four on a line.

We manufacture a large line of telephones, switchboards and specialties.

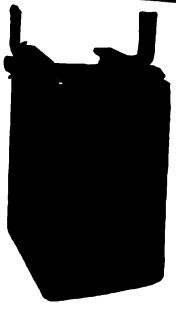
Our wall or desk, sets, as illustrated, are growing in popular favor because they are so convenient. Price reasonable.

Ericsson Telephone Co.

Manufacturers of

SWITCHBOARDS, TELEPHONES AND TELEPHONE SUPPLIES

296 BROADWAY, NEW YORK



STORAGE BATTERIES

UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY

CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

NEW YORK OFFICE: 253 BROADWAY.

GENERAL OFFICES AND WORKS: BUFFALO, NEW YORK.

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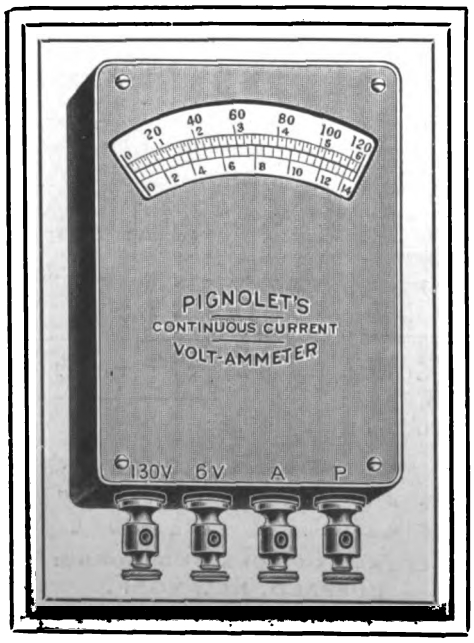
HOW DO YOU TEST FOR TROUBLES?

PROBABLY you have an old magneto bell rigged up in some fashion. It will show in a general way a short circuit, but you know it isn't accurate or reliable. Why don't you get our special volt-ammeter for resistance measurements?

With this instrument and a few cells of battery you can detect a short circuit and tell how bad it is. You can tell whether the receiver is off the hook or whether there is a wire across the lines. You can detect a ground and measure any ordinary resistance. In fact, when a line gets in trouble, by throwing a key you can connect in circuit the voltmeter and in less than a minute you will have determined the nature of the fault. When the troubleman goes out he will know exactly what to look for. This saves time, and therefore money.

The apparatus and methods are very simple. We will explain it all to you. Our instruments don't cost nearly as much as you think. Write us about them.



LOUIS M. PIGNOLET

Originator of the Voltmeter Habit

80 Cortlandt Street

NEW YORK

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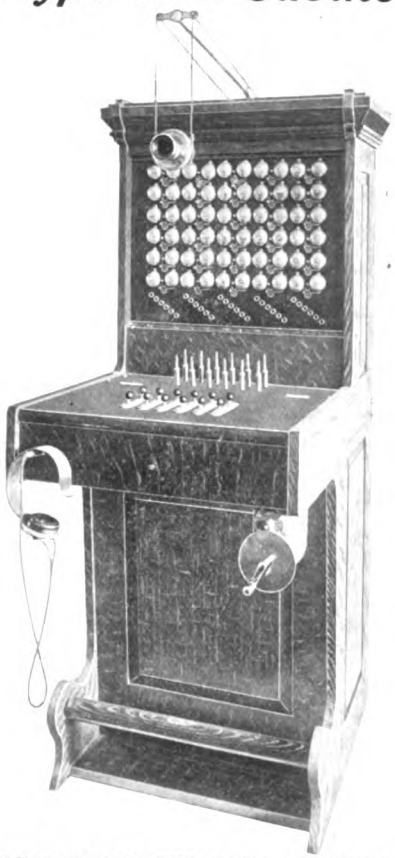
CENTURY
100% GOOD

A "Century" Rural Bell Signal Switchboard
Type 5-A-Cabinet

Equipped With
30 Bell Signals
6 Pairs Plugs.
Complete
Operator's Equipment

Design
Material
and
Workmanship
the
Very Best

All
Century Apparatus
Is Fully Guaranteed
To The
Purchaser



Signals Are
Equipped With
Shutter
and
Night Bell Contacts

Highest Efficiency
With Lowest
Maintenance Cost
Is What
All Century
Apparatus Gives

The Century
"Platinum Electrode"
Transmitter
Is Used On All
Century Telephones

SEND FOR PRICES AND CATALOG

CENTURY TELEPHONE CONSTRUCTION CO.

OFFICE & SALESROOMS
528-540 ELLICOTT SQ.

FACTORY & WAREHOUSE
481-489 WASHINGTON ST.

BUFFALO, N.Y.

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THE BENBOW

Adjustable Swinging

Telephene Bracket

Fits any style of 'Phone, Desk, Wall or Partition.
Endorsed and used by Telephone Companies.

Write for Price List. **AGENTS WANTED.**

THE BENBOW COMPANY, Manufacturers,

14 South Broad Street, PHILADELPHIA, PA.

FARMERS' TELEPHONES
AND TELEPHONE SUPPLIES
LINEMEN TOOLS, BATTERIES, WIRE, BRACKETS, PINS, CROSS-ARMS, BRACES, LAG BOLTS.
Quick Shipments. Prices are Right.
HIGH GRADE TELEPHONES AND SWITCHBOARDS.

FARR TELEPHONE & CONST. SUPPLY CO., CHICAGO.

TELEPHONES SOLD BY FARR CHICAGO

Exchange Telephones
and Private Line Telephones, Express Switchboards, Gong Switchboards, Large or Small Transmitters, Receivers and Hooks.

A set of Bookkeeping Blanks and Ledgers Free with a $10. 00 Order.

"INTERNATIONAL" PATENT TELEPHONES SWITCHBOARDS

For any size public exchange. Their quality sells our goods
Write for prices and samples

INTERNATIONAL TELEPHONE MANUFACTURING COMPANY
HARRISON AND CLINTON STREETS - - - - - - - CHICAGO, U. S. A.

Protect Your Subscriber

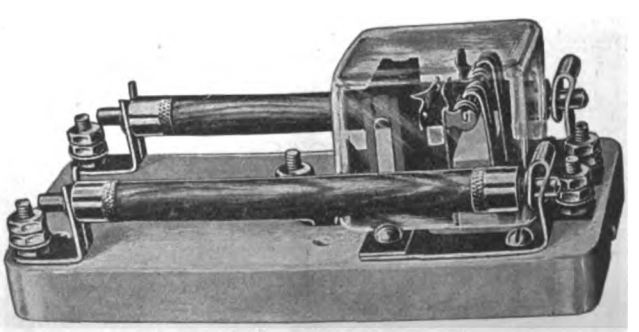
against lightning shocks—and yourself against a damage suit.

Protect Your Instruments

against disastrous currents of all kinds.

COOK'S "TYPE 12A." Subscribers' Station Protector is an insurance policy—life, fire and accident. It is equipped with ***COOK'S OWN PATENTED SELF-SOLDERING HEAT COIL;*** also with carbon lightning arresters and tubular fuses, insuring protection against all sorts of currents.

Costs little and saves lots



FRANK B. COOK, Manufacturer

238 W. Lake Street, CHICAGO.

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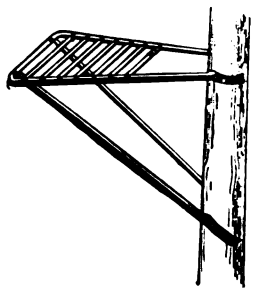
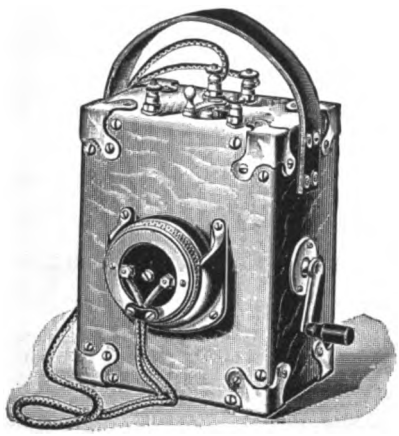
SECURITY POLE SEATS



The particular claims for this pole seat are light weight, great strength, neatness and low cost to you.
Pole Seats, weight 28 pounds, each.....$2.50

THE F. BISSELL COMPANY
Manufacturers and Jobbers of
TELEPHONE SUPPLIES
226-228-230 HURON STREET
TOLEDO, O.



No. 18.

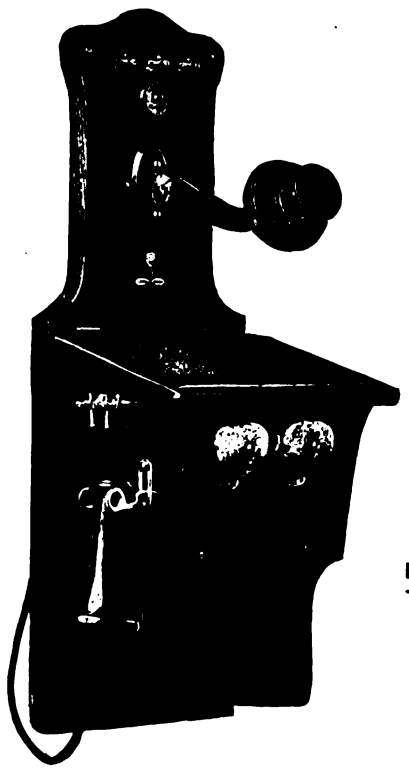
Bell-Style Lineman's Test Telephone

This instrument is made upon the same lines as the Bell test sets, and is the only 'Phone of its kind made by any independent telephone manufacturing concern. :: ::

LIGHTEST AND MOST COMPACT TEST TELEPHONE MADE

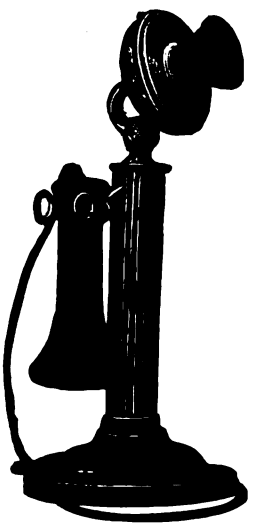
Every up-to-date Telephone Man should have a copy of our new No. 8 Catalog.

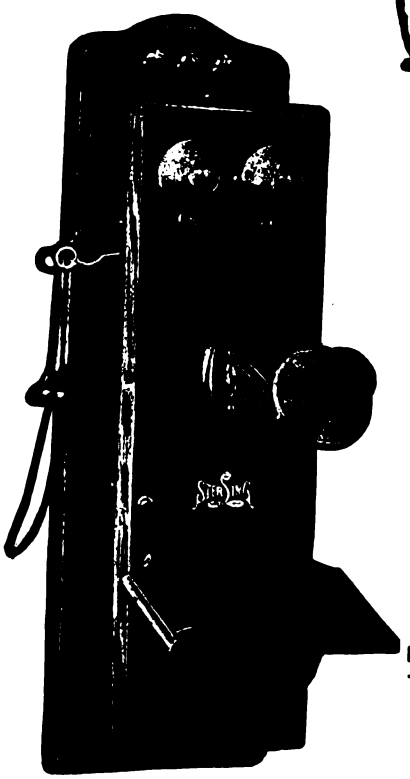
Conn. Telephone & Elec. Co.
MERIDEN, CONN., U. S. A.



TELE-PHONES FOR ALL USES

STERLING ELECTRIC CO.
LAFAYETTE, IND.





HIGH CLASS EQUIP-MENT

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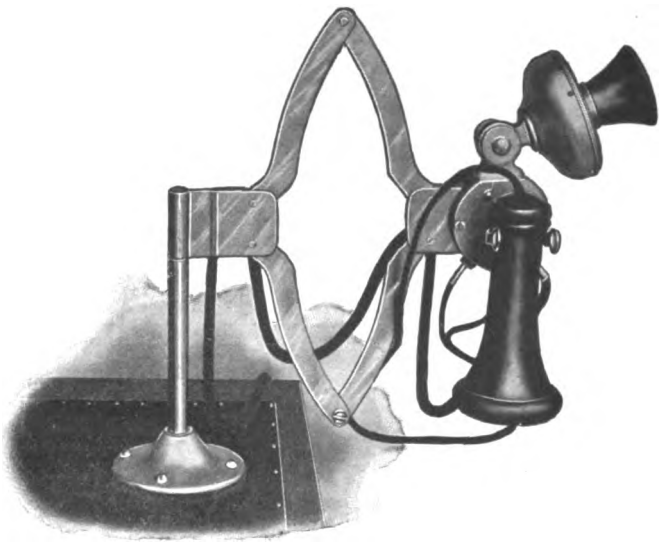
WHAT YOU SAVE, NOT WHAT YOU EARN, DETERMINES YOUR DIVIDENDS.



No. 5 For Flat Top Desk
(Suitable brackets for roll top desk and for wall are also furnished.)

Figure the difference between average cost of maintaining a wall and desk set, multiply by the number of desk telephones in use and see how much could be saved by replacing your old desk sets with Adjustaphones.

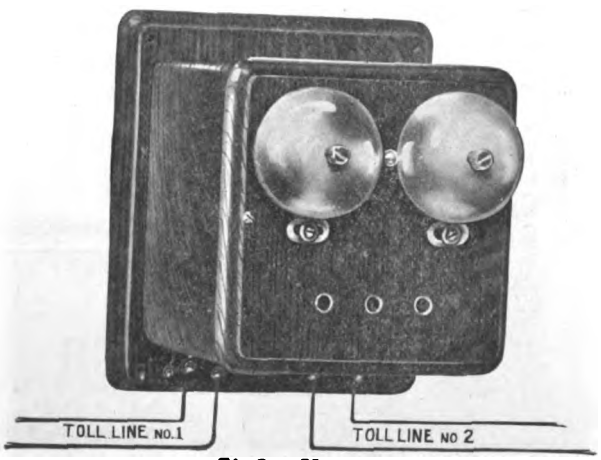
The Adjustaphone is used by many of the largest Exchanges in the world, both Independent and Bell.

Circular and prices on request.

Chicago Writing Machine Company, Mfrs.

105 Wendell Street, CHICAGO, U. S. A.

Toll Line Switch



Style No. 20

No. 80 Jack

S. H. COUCH CO.,

162 PEARL STREET, :: :: BOSTON MASS.

Do You Use This Kind of Booth?

An Illinois weekly paper recently contained the illuminating information that one of the village lights "is spending his vacation at carpentering. He built a booth for the telephone company, which was very artistic." Meaning, probably, that the telephone company is artistic, for we don't believe such a booth could be.

We have had years of experience in designing artistic, serviceable, sound-proof booths.

Don't order from a carpenter.

Write us for cheaper prices and better booths.

YESBERA MFG. COMPANY

TOLEDO, OHIO

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ANDRAE "Giant" Telephones

The feature of

Andrae Ringers

that appeals to all telephone men is the simple adjustment---a screwdriver is the only tool required.

CORES ARE MADE OF

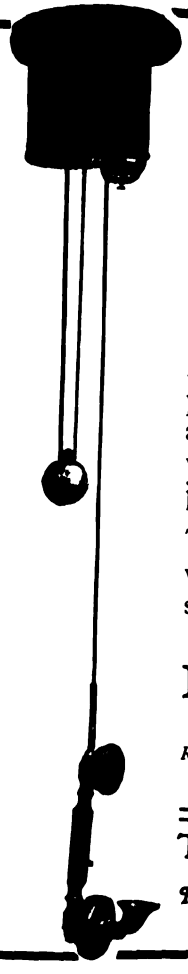
double annealed imported Norway iron, wound with all silk wire. Gongs are highly nickled and polished bell metal, and are fastened directly to the cabinet.

Standardization of this usually troublesome apparatus enables us to produce cheaply, cutting down the cost of our telephones without detracting from quality.

Write for new telephone catalogue free.

Julius Andrae & Sons Co.,

945 West Water Street, . MILWAUKEE, WIS.



"Once on a Time"

as Kipling sings,

it was necessary to climb out of a comfortable seat and chase across the room---to use the telephone---there was no shorter way.

MANY MINDS have been at work to *SUPPLY* this final link.

And when it was at last accomplished, behold, it was by applying agencies in practice during centuries when the voice could not be projected even a mile.

Two simple pulleys and a counterweight---operating on a cord extension from the ceiling cabinet.

The

Pendent Telephone,

always "at the crook of the elbow"

Ready, Adjustable, Adaptable, Efficient, Elegant, Luxurious, Inexpensive. Write Us.

THE VOUGHT-BERGER COMPANY

Makers of First-award

Telephones, Switchboards, and Appliances

LA CROSSE, WISCONSIN

Our System is

"Just What You Need"

FOR

GENERATOR CALL PARTY LINES

Single wire **Ground** Lines, Straight Metallic or "Divided Circuit" Metallic Lines.

When Switchboard Drop falls, **it means** that some subscriber has called "Central."

Drop does **not** fall when subscribers call each other, as **Alternating** current is used for this, and our Selective Central Relay does **not** respond to Alternating current.

When Subscribers call "Central," **Direct** current is used, therefore they do **not** ring Telephone Bells along Line, but **instantly** throw Drop at the "Central" desired (either of Two "Centrals").

We advise Managers, Stockholders, Subscribers and Central Operators of party lines to send us their address. We CAN SAVE you ALL—Time, Labor, Wear and Tear on Apparatus, Nerves and Temper.

REMOVE from your Switchboard your Cow, Sheep, Sleigh and Extension Bells. Use Drops made by the manufacturer of your Board in this VALUABLE space, connect Drops to our Selective Central Relays, and give your Subscribers **better** service than is POSSIBLE any other way.

You can use the Telephones you have now.

THE T. & A. SELECTIVE CALL CO.

Sole Manufacturers. GENESEO, ILL.

Judge Tourgee, describing a telephone conversation, said: "You step up to the instrument and say 'Hello' a few times, then you reverse it, and pretty soon you leave off the last syllable altogether."

But he was not speaking of the

EASTERN TELEPHONES

They Work

Write us for prices

EASTERN TELEPHONE MFG. CO.

WESTCHESTER, PA.

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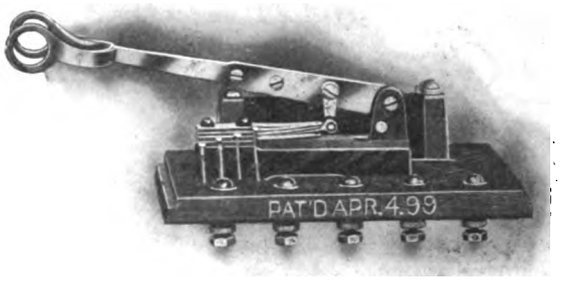
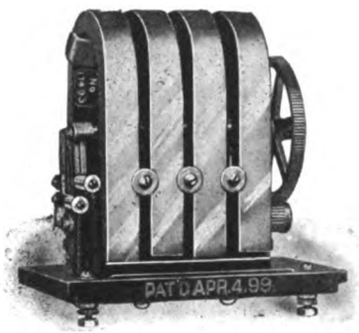
THE PARTS REMOVED



MONARCH TELEPHONES are so constructed that every part can be removed instantly. The shelves with the hook switch, induction coil and generator, slip from the cabinet without disturbing the permanent wiring. The time taken for repairs or inspection is therefore reduced to a minimum.



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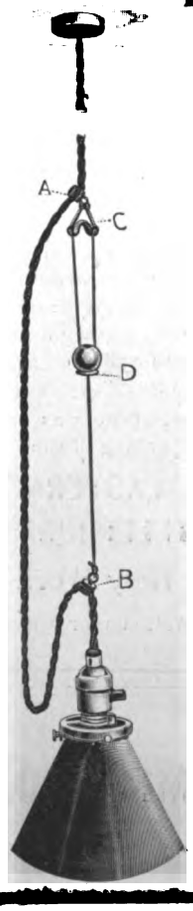

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Some of the Writers

PROF. F. B. CROCKER, head of Department of Electrical Engineering, **Columbia University:** author of the sections on Storage Batteries and Management of Dynamo-Electric Machinery.

PROF. WILLIAM ESTY, head of the Department of Electrical Engineering, **Lehigh University:** author of the section on Alternating Current Machinery.

WILLIAM BOYRER, Telephone Expert and Consulting Engineer.

H. C. CUSHING, Jr., Wiring Expert and Consulting Engineer: author of the section on Wiring for Light and Power.

PROF. DUGALD C. JACKSON, Collaborator with **PROF. GEORGE C. SHAAD, University of Wisconsin:** author of sections on Power Transmission, Electric Lighting and Central Stations.

J. R. CRAVATH, Western Editor of the **Street Railway Journal,** author of the section on Street Railways.

PROF. LOUIS DERR, Mass. Institute of Technology;

CHAS. THOM, Chief of **Quadruplex Department Western Union Telegraph Co.,** author of section on Telegraphy, and others.

Partial Table of Contents

PART I.—Static and Dynamic Electricity—Primary Batteries—Ohm's Law—Wire Calculations—Electrical Measurements—Wiring for Light and Power—Electric Telegraph, including the Duplex and Quadruplex.

PART II.—Theory of Dynamo-Electric Machinery—Design and Construction of Dynamos and Motors—Types of Machines—Storage Batteries, including Theory, Management and Types—Testing Efficiency.

PART III.—Incandescent and Arc Lighting—Electric Railways, including Car Wiring, Line Construction, Third Rail and Multiple Unit System—Management of Dynamo-Electric Machinery—Power Station Work—High Tension—Transmission.

PART IV.—Theory of Alternating Currents—Construction, Types and Operation of Alternators, Transformers, Induction Motors, Synchronous Motors and Rotary Converters.

PART V.—The Telephone—**Telephone Lines**—Circuits—Distribution—Line Construction—Distributing Points—Submarine Cable Lines—Cross Talk—Pupin's Load Coils—**Telephone Exchange**—Switchboards—Exchange Wiring—**Operation and Maintenance** Systems—Local Calls—Trunk Calls—Toll Boards and Lines—Long Distance Switchboards—Direct and Party Lines—Code Signalling—B. W. C System—Private Branch Exchanges—**Common Battery System**—Testing and Clearing Trouble—Wire Chief's Desk—Testing Circuits and Apparatus—Testing New Cables—Cutting into Service—Locating Faults—Replacing Defective Sections.

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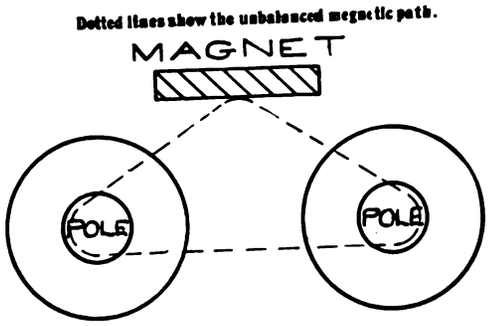
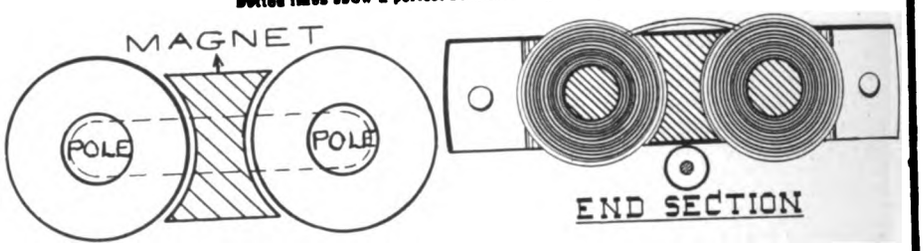
Magnetic Field of Old Style Ringer with Magnet On Side.

Dotted lines show the unbalanced magnetic path.



Magnetic Field of Swedish-American New Patented Ringer with Magnet in Center.

Dotted lines show a perfect balanced magnetic path.



THE illustrations clearly demonstrate that **all** ringer movements heretofore have been manufactured on the wrong principle. It remained for the Swedish-American Telephone Company to devise and place on the market a perfectly balanced ringer movement; a ringer with a perfectly balanced magnetic field. **All** other ringers have the magnet on one side of the coils, thereby dissipating a good percentage of the energy, consequently the bells do not ring as loud as they should, nor will as many operate satisfactorily on one line, as properly balanced ringers ought to. The make-up of this new ringer **not** only increases the efficiency, but permits of the most compact and durable construction; fewer parts; more positive adjustment and will operate more satisfactorily for a longer period and at less cost for maintenance than **any other. All** Swedish-American Telephones are equipped with this new ringer, placing our apparatus one notch higher in the art of Telephony and ahead of **all** other makes, either Bell or Independent.

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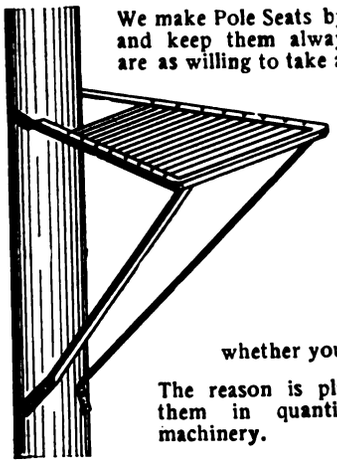

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The American Telephone Journal

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VOLUME 10 SATURDAY, SEPTEMBER 24, 1904 NUMBER 13

NATIONAL CONVENTION MEETING AT ST. LOUIS

(By Telegraph.)

NEW life has been infused into the National Telephone Association. At the annual convention held at St. Louis on Sept. 21, 22, 23 and 24 the name was changed from the Independent Telephone Association of the United States to the National Telephone Association. A new constitution and by-laws were adopted and a permanent committee appointed to reorganize the association. This committee, which is mentioned elsewhere in this report, was authorized and directed to effect a national organization on the line of the "Ohio Idea." It was decided to have a salaried assistant secretary and assistant treasurer to give up their entire time to association business. The association will have a permanent national headquarters when the organization is effected, and it will be its duty to make the injury or welfare of one company composing the membership the concern of all. The idea is to put Independents on a footing where they may present a united front against the Bell, so that solid organization may be opposed against solid organization.

Leading Features of the New Constitution.

The name—The National Telephone Association of America.

The object—To defend members by moral effort, co-operation, and other means.

Officers—Not less than fifteen trustees, but there must be one for each State affiliated with the organization. A President, First and Second Vice-President, a Secretary and a Treasurer.

Committees—Executive Committee of nine, including the President, to be appointed by the President. Litigation and Legislation Committee of five.

Meetings—Annual and also such special meetings as Executive Committee may direct.

Meetings—Annual and also such special meetings as or individual company representing not less than 500 telephones or 500 miles of pole lines shall be entitled to membership on application to and approval of Executive Committee.

Delegates—At annual meetings one for each 10,000 telephones or miles of pole lines or fraction thereof in any one district. Delegates representing less than 10,000 telephones or miles of pole lines to have only part vote in proportion to number they represent.

Quorum—A majority of all members present at meetings.

The annual dues shall not exceed one cent per telephone or one cent per mile of pole line.

Only Independent interests are eligible to membership.

Any company or body ceasing to be Independent or any officer ceasing to be Independent must withdraw. Where there is a State organization representing a majority of Independent interests in that State, those seeking admission must be affiliated with the State organization.

Manufacturers are not eligible to membership.

Members must be elected by ballot.

The New Officers

A nominating committee, composed of E. B. Fisher, Maxine Reber and George W. Beers, was appointed. They presented the names of the following to serve as officials of the association during the ensuing year:

President—J. B. Hoge, of Ohio.

First Vice-President—Breckenridge Jones, of Missouri.

Second Vice-President—William Flynn, of Pennsylvania.

Treasurer—Hugh Dougherty, of Indiana.

Secretary—A. L. Tetu, of Kentucky.

These officers were unanimously elected by the association.

The attendance was very large and every delegate present took a personal interest in the meeting, which resulted in the meeting-room being crowded for every session.

The convention adopted by rising vote resolutions of sympathy for Judge J. M. Thomas, former president of the association, who is now fatally ill. Greetings were sent to him by wire.

Edward E. Clement then read an interesting paper on the "Patent Situation." He said an average of thirty patents were being issued monthly. The work has increased to such an extent that it now takes four examiners in this special class. A total of 4,298 telephone patents have been issued to date, 3,798 of which are in the telephone class proper and 500 relating to appliances intimately connected with telephone subjects. About 24,000 claims are in force in telephone patents that must be carefully watched to prevent infringements. Mr. Clement pointed out the special need of a close, active organization for protection in patent litigation and infringements. Although there are at present no large suits threatened, yet Mr. Clement believes that steps should be taken in case of an emergency. He read letters to him along this line from John C. Marble, president of the Home Telephone Company, of Los Angeles, Cal.; O. C. Snider, general manager of the Home Telephone Company, of Kansas City, Mo.; E. H. Moulton, president of the Twin City Telephone Company, of Minneapolis and St. Paul, and W. H. Barnard, vice-president of the United Telephone and Telegraph Company, of Philadelphia. All of these gentlemen strongly urged a national organization on advanced lines.

Organization Committee Report

At the conclusion of Mr. Clement's paper the committee on organization presented its report through Senator Kleine, advising that the national organization should be composed of delegates from each association on a basis of one delegate for each 10,000 telephones, and for long-distance companies one mile of toll lines to be classed as one telephone.

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States not having organizations to be entitled to send delegates on the same basis by companies. Any company with less than 10,000 telephones to have the right to send a delegate, who shall have floor privileges at all national conventions and vote in proportion to number of telephones controlled by his company. Each telephone and supply manufacturers to be entitled to one delegate on payment of the annual dues. Each telephone and pole line mile shall pay a tax of one cent to support the association. This report was unanimously adopted by the convention and the same committee appointed to take up the details and draw up a constitution.

On Thursday morning Frederick S. Dickson, president of the Cuyahoga Telephone Company, of Cleveland, Ohio, read the following paper, which was listened to with great interest:

HINTS TO INDEPENDENT COMPANIES*

By Frederick S. Dickson.

I AM in a measure in accord with our enemies when they declare that the telephone business is a natural monopoly and when they insist that there ought to be but one telephone system in a town. I say "ought," for the Bell Telephone Company being in possession of the field, "ought" have given good service at reasonable rates. By so doing competition would have been rendered practically impossible. Unfortunately for the people of this country, the Bell company never did give proper service nor furnish their service at reasonable rates until forced to do so by competition. When the Bell was in control of the field the service was uniformly bad, and moreover the field was not properly developed and no attention was paid to accommodating the public The Bell policy was to develop thickly settled quarters in large cities. It actually refused in every instance to run lines in sparsely settled sections. Its service was extended only to the thickly settled business portions of large communities. It refused absolutely to extend lines into the residence sections of the largest cities.

Even when the Independent companies entered these large cities the Bell waited until the Independent company began laying conduits and stretching cables before offering accomodation to residence sections. In Cleveland, Ohio, for instance, when the Cuyahoga Telephone Company entered the field the Bell company had only 4,200 telephones in service. The rate for a business telephone was $120 a year. At this rate business men of Cleveland were paying nearly 3 cents for each connection. Competition changed the conditions radically. The Bell company, under the stimulus of competition, increased its system to 16,000 telephones. Business charges were reduced to $84 per year so that a subscriber who had paid nearly 3 cents for a connection now pays a little more than one-half a cent for each possible connection. A party taking both telephones in Cleveland will pay at the highest business rates $156 a year. He will have at his disposal 28,000 possible connections. On this basis he would be paying less than six mills per year for each telephone to which he has access. Thus competition has reduced the cost of telephones to one-fifth of what it was before in Cleveland, and at the same time has resulted in a general improvement of the service.

However objectionable two telephones may be in view of these results, two telephones seem to be a necessity at the present time. Competition will continue to benefit the general public. Which company will be the victor is a question for the future and one that will be determined only by time. In my opinion local ownership will be a factor of prime importance. The more local stockholders there are in a telephone system the greater will be the advantage of that system. The Independent exchange should be owned and controlled by its own people. Such ownership insures better service and a local support with which foreign-owned corporations cannot for long compete.

But local ownership alone will not insure success. You have got to give better service than your rivals. Make your operators and other employees take an interest in making your service good. I am a firm believer in profit sharing with employees. If one wants more wages, let him work more, save more and earn more, and the profits earned will give him more. We have tried this plan in Cleveland with encouraging results for the past year and we propose to continue it for another year.

I am afraid that some of my friends are under the impression that the chief duty in life is to fight the Bell company. This is surely a mistake. Let us first please the telephone users and then we can please telephone investors with attractive dividends. Don't bother your heads about the Bell company until the Bell people get in your way. Then run over them.

I was introduced to President Fish, of the Bell company, shortly after I entered the telephone field. He told me that we could not possibly succeed in Cleveland. "We have let you people alone so far out there," said Mr. Fish, "but you can't expect us to ignore you much longer. When we are ready, we will simply crush your enterprise." In reply to this threat, I told President Fish the story of the man who had a reputation for being "d——d industrious while being licked."

I don't know that we have annoyed the Bell very much, but I do know that we have been "d——d industrious and 'aint' licked yet." Do you know that the Cuyahoga Telephone Company is actually giving better service in Cleveland and at less money than is the Bell? We have added over 3,000 telephones in Cleveland in the past five months and we are increasing right along at the rate of 700 per month.

Editors' Note: Abstract of paper read at the National Convention, St. Louis.

Manufacturers in the Association

A delegate brought up the question of whether manufacturers should be admitted to the association. This caused considerable discussion on the floor and afterwards in private conference. Thomas W. Finucane, of the Stromberg-Carlson Telephone Mfg. Co., was specially called on to give the manufacturers' side of the question. Mr. Finucane said that he was not present in his capacity as a manufacturer, but as a delegate of the Rochester Telephone Co., of Rochester, N. Y. Continuing, Mr. Finucane said: "Manufacturers, in my opinion, should not be eligible to membership in operators' organizations, either State or national. The operators should stand alone. Manufacturers should have an organization of their own."

This seemed to express the sentiments of most of the manufacturers present, and many urged Mr. Hoge as chairman to work along these lines in perfecting details. "Leave the manufacturers out," they said; "it will be for the best interests of the organizations."

Mr. McMeen Speaks

After this matter was disposed of, Samuel G. McMeen, of Chicago, read a strong paper entitled "Planning a Telephone System." He went into minute details in a masterly manner. This paper will be printed in full in our next issue, as it is a very interesting one. At the request of the chairman, Mr. Dwight Sapp, of Ohio, explained the "Ohio idea" on which it is proposed to model State and organization work. This idea follows closely the lines of the paper by Mr. Hoge, which is printed in this report. At the request of Mr. Hoge, Senator Flynn, of Pennsylvania, who is largely interested in the Pittsburg and Allegheny Telephone Company, made an address. Mr. Flynn said that the success of the organization's scheme depended upon the activity of the leaders. Paid officials of a high grade would be needed. They should be selected with great care and should get good pay.

Association Name Changed

Edward P. Baird, of Chicago, moved that the association's name be changed to National Independent Telephone Company, as the old name did not convey the proper idea. This was unanimously adopted by the association.

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THE FIRST DAY'S SESSION

President Dougherty called the convention to order at 11 o'clock on Wednesday, the 21st. After a few introductory remarks, he introduced Professor Goldsborough, Chief of the Electrical Bureau of the Exposition, who in an appropriate speech welcomed the delegates in behalf of President Francis of the Louisiana Purchase Exposition.

President Dougherty's Address

President Dougherty then read an address, saying among other things: "There should be a fealty between Independent operators. Each should have the sympathy of all others. At present this does not prevail. In some instances one Independent company has tried to drag down another from jealous motives. By public criticisms and connivation with tax assessors they have sometimes taken away the business of another company and increased expense account to such a point that the weaker opponent has gone to the wall. These tactics have not been noticeable of late but it is generally understood that they have prevailed in some of the States."

Continuing, President Dougherty said: "We have reached a point where a better understanding must exist between operators. We must become more of one mind and therefore must become as one institution. Apparatus and construction should be better standardized, and we must take better care of the public. These criticisms, it must be understood, carry no reflection upon Independent operators, for, as a whole, no class of business men are more deserving, and as business promoters and managers none stand higher in the estimation of financiers. Independent securities have become a boon to investors, and as time goes on telephone bonds will become more and more staple until they will occupy the foremost place of all industrial securities. It is necessary that operators should join their energy and capital and thus prepare for better service both in exchanges and toll systems. At the present time too much stress cannot be laid upon necessity of action in respect to long-distance lines. Independent lines must reach out and connect with all the great cities so that it will be possible for one Independent company to reach any other Independent company no matter where situated."

Closer Co-operation the Key-Note

President Dougherty's address formed the keynote of the convention. The whole sum and substance of the matter is that closer co-operation and a more perfect organization is needed. A detailed plan to bring this about was presented in a paper read by Mr. J. B. Hoge, which will undoubtedly form a basis for re-organizing the National Association.

Needs of Telephone Engineering

A paper by Professor J. C. Kelsey, of Purdue University, was next read by the secretary. It was entitled, "What Telephone Engineering Needs." There was a time, said Professor Kelsey, when the profession of a telephone engineer was looked on as a joke, and there was a lot of truth in that. Under monopolistic control there was little advance, mainly from the reason that ideas were not wanted from the rank and file. Only a few men were thinking and they were overworked. Muzzled opportunities destroy incentive and lower the dignity of early telephone engineers; but they worked well. The greatest harvest which awaited the Independent methods of frankness and openness has been proved by the enormous strides which have taken place, until now the profession of telephone engineering has taken a front rank in the science of electricity.

National Association's Aid

In this particular department of Independent telephony the National Telephone Association has set a good example in that it has assisted in making public the various engineering problems which have thus been brought before the minds of thinking men, who have devised means to overcome the difficulties. Let us hope, continued Professor Kelsey, that all the interests engaged in Independent telephone engineering will realize the necessity of publicity in setting forth their problems so that the world may have a chance to applaud the telephone engineer. Telephony needs no aid at present but publicity to arise to a proper dignity.

Strengthen the Association

The paper by Mr. J. B. Hoge was read next, and brought about active discussion. Mr. Hoge made a strong argument for the reorganization of the association and the employing of salaried officers to carry on the work vigorously. In full his address was as follows:

THE VALUE OF ORGANIZATION

JAMES B. HOGE.

ORGANIZATION is the watchword of the twentieth century. There never was a time in the world's history when the subject of organization received so much attention as at present. It is generally conceded that proper organization is a good thing, but that in some cases its privileges are abused. However, that does not condemn organizations any more than the fact that laws are daily violated condemns the necessity of having national, State and municipal laws for the government of our people. The subject assigned me is one that is commanding the best thought of Independent telephone people to-day.

It is now about ten years since the first Independent telephone properties were put on an operating basis. Very few were put in successful operation until 1898, and comparatively few until 1896 and 1897.

The National Independent Telephone Association was organized in 1897 principally for the purpose of defending patent litigation that was then threatening the very foundation of the Independent movement. The way this association covered that field and protected the patents is now a matter of history and needs no explanation or defence.

The Independent telephone movement has grown beyond all expectation. The Bell Company had controlled the telephone situation more than seventeen years and had less than 300,000 telephones in operation. When the basic patents expired the American people only needed to be allowed the privilege of using the telephone, applying it to their business and social life in order to appreciate its full value. During the past ten years the Independents have installed more than 2,500,000 telephones, connected with their various systems throughout the United States. During the same time their competitor has many times doubled the number they had when the Independents were allowed to enter the field, so we find the telephone growth to-day is greater than that of any of the other public-serving corporations. The result has been that the Independent telephone companies have extended their systems from county-seat to county-seat and from center to center until to-day they are touching elbows with each other on practically every boundary line. Until the past three years they had but very limited long-distance service; to-day their long-distance service in many cases is equal to that of their competitor, and promises in a very short time to be in every way equal, if not superior, to their service. The Independent movement is made up largely of the most substantial and most active business interests of the country.

The leaders of the Independent movement have gone into the business from various other vocations, and the result has been that they have carried their former ideas as to bookkeeping, operating rules and regulations, from the banking, manufacturing, mercantile, transportation, gas and electric light business, into the telephone business. It is important and necessary to standardize rules and regulations, form of accounting, advertising methods, equipment and various other essentials, so that the different companies may be operated as a single property. It is

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no more necessary to consolidate these local exchange properties in order to carry it out successfully than it would be to consolidate all the steam railroads, or electric railroads, in the United States in order to operate them successfully on a uniform basis. Several years ago the steam railroads adopted standard gauge of track, so that to-day practically every road in the United States has adopted the same. The locomotives and cars made in the various shops of this country are so thoroughly standarized that they can be operated successfully in trains with other cars and locomotives from one end of this country to the other. Brakes, couplings, etc., have been standardized so that there is no longer the necessity of telegraphing or writing to find out whether or not the equipment of this road or that road can be operated over the tracks of some other company. Rules and regulations governing the handling of passengers, baggage, etc., have all been standardized so that to-day through tickets are sold over the lines of the various companies, beggage is checked through, freight is billed through, and rates are quoted from one distant point to another. Schedules have been arranged so that trains connect with each other at terminal or junction points. Time for operating trains has been standardized, thus simplyfying the matter of traveling, making it more convenient for the public and less annoying to the operating companies.

The American Bankers' Association, who held their convention in New York City last week, have for the past fifteen years been working out a system for the banks of this country that has simplified the methods of handling their business, and at the same time have thrown around themselves by the enactment of proper laws and otherwise a number of safeguards that enables them to deal more cautiously with the very life-blood of our commercial and social welfare. A number of those most actively identified with the Independent telephone movement have been active on the committe of that association, working out economies and throwing around the association the safeguards mentioned.

During the past five or six months I have been in correspondence with various officers of a number of State associations, and find that in nearly every case they agree that the time is ripe for better organization. What we need to-day is uniformity of organization. There is no other business parallel to that of the Independent telephone companies. In Ohio a decision has recently been handed down by the Supreme Court of the State declaring that city councils have no right to regulate rates, which was of extreme importance to nearly all the operating companies, as in many cases the early franchises provided for rates that were too low to carry on the extensive business that the companies are now doing.

In practically every case the public recognizes that they are getting a more extended and better service than they expected at the time the franchise was granted and the early contracts entered into, and are therefore willing to sign new contracts at fair rates. However, the early franchises provided a means for the grandstand politicians and municipal reformers to start litigation against the various companies. This decision has therefore been most valuable to all Independent telephone companies, and especially to those in Ohio. If this suit had been inaugurated against some weak company and had been allowed to go by default, the results might have been most disastrous. With the proper kind of organization suits of this character will be fully protected.

In the post office fight last winter, which was fought vigorously by the Independent companies, there was a great deal of duplication in the way of letter-writing, personal interviews, etc., which with the proper kind of organization could have been taken care of successfully by having each State look after its own senators, and each district in the various States look after their own congressmen. In addition to this, the advantage of a strong organization would carry weight with the various legislative bodies, national and State, much greater than where taken up in a haphazard sort of way without proper organization.

During the past eight months we have reorganized our Ohio Association by dividing the State into nine districts. The State association has a president and nine vice-presidents, secretary, assistant secretary and treasurer, and an executive committee of four members besides the president, he being an *ex-officio* member. There is one vice-president from each district, and this vice-president is president of his district. Each district has an executive committee consisting of one representative from each county in the district. Hereafter our State association meeting will be a delegate body. Each district will elect one delegate to the State convention for each 1,000 telephones or fraction thereof they have represented by their district associations. A mile of long-distance toll line is counted as one telephone. In this way district meetings will be held quarterly or semi-annually so as to bring people with common interests together frequently to discuss subjects of special importance to the district.

In this way operating methods, rules and regulations, etc., can be standardized; meetings can be held without the loss of but very little time and at a nominal expense. The State Association will take up subjects of special importance to the Independent telephone interests of the entire State. We believe this plan is feasible and practicable for all the States in the Union to adopt. We believe it feasible and practicable to carry it a step farther, making an organization of the various State organizations, so that the various districts would elect one delegate annually to a general convention, and the State associations at their annual meetings would elect a sufficient number at large so as to give the State one representative for each 10,000 telephones or 10,000 miles of toll line they have represented in their State associations.

In that way the State delegations would be able to exchange ideas and to conduct their business on a uniform basis. Statistics can be accumulated and published that will be of special value to the Independent companies. By working the entire plan out on a basis of this kind the securities of the various companies will be strengthened. The equipment of the companies will be improved upon from time to time. The disposition of two companies to parallel lines or to compete with each other in any way will be minimized. The matter of adverse legislation, national or State, can be protected. This sort of an organization would be able to get the best results from their various business and political leaders.

This is not a new method of organization; it is applying a well-established and well-developed plan to our business. It is human nature to take pride in being part of a successful organization.

As a matter of practical illustration I wish to call attention to but two points, which I believe will explain themselves: First, the matter of toll station signs. Up to the present time almost every company has had their own ideas about the same, and the result is that any one of the operating managers here assembled would not know what to look for if he went into most any city 25 to 500 miles away from home. That being the case, how do you expect the traveling public to keep track of the different companies and different forms of toll signs? In June of this year I spent nearly three weeks here on the Fair Grounds, and I must frankly admit that it was much easier for me to locate a Bell pay station than it was the pay stations of our friends, the Kinlock Company, for the sole reason that I did not have to read the American Bell sign, but I did have to accustom myself to the Kinlock sign, which takes practice.

Operating rules and regulations must be standardized. Some time ago I undertook to carry on a long-distance conversation over three different companies' lines, all of which had different operating rules about monitoring lines, and the results were that our conversation was killed by the kindness of the various monitors.

In conclusion I desire to urge the importance of proper organization. We must draw a line to perfect the Independent system, and then cut to that line and the result will be most advantageous to all. First it will improve and simplify the service which benefits the patrons. Second it will reduce the operating and construction expense to a minimum, give greater stability to the securities, and be generally beneficial to all companies.

There is room for two telephone systems but not room for a third. With proper organization on the part of the Independent companies they will continue to be stronger than their opponent, and will receive their full share of the business on a fair and profitable basis.

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President Simmons, of the Atlanta Telephone & Telegraph Co., of Atlanta, Ga., strongly urged carrying out Mr. Hoge's plan, and illustrated the need for effective organization by relating his experience. In one instance eight of his company's cables were ruined by wanton cutting, and depredations still continue.

Thomas Finucane, of the Stromberg-Carlson Telephone Manufacturing Co., of Rochester, N. Y., was then called upon to express an opinion. He said: "Ordinarily I don't believe in co-operative organization. But in this instance, if efficient men can be secured to guide it, the plans of the association as outlined in Mr. Hoge's paper would be good. To secure the right kind of men the right financial inducements would have to be offered, but I believe the association could well afford to pay for such men as could give their entire time and services to it."

Senator Kleine, of the Interstate Telephone Company of Pennsylvania, expressed decided approval of Mr. Hoge's plan. He said: "Only by efficient organization can the Independents be sure of drawing capital for extensions. The present system of the National Association is farcical."

Didn't Know of Convention.

"We in the East did not know there was to be a convention. Personally, I only learned about it in a roundabout way, and when I arrived in St. Louis there was no one to tell me where the Convention was to be held. This sort of system should be done away with. We should organize on regular lines and have a competent, salaried secretary to devote his entire time to the welfare of the association. With systematic organization to extend the powers and duties of the association, in a short while there would be no difficulty to find plenty of capital which at present is something almost impossible. There is no safer or more conservative investment than Independent telephone securities. They are much better than trolley securities. I know, because I am interested in both. In trolley systems careless employees may wipe out years of profits through one collision. No such possibility exists in telephony. I think that conditions are now ripe for closer organization. The old jealousies seem to have pretty well disappeared. Formerly we were afraid that we could not get enough territory. Now, most of us know that we have too much."

The Michigan Way.

E. B. Fisher, of the Citizens' Telephone Company of Grand Rapids, said: "Great benefits have come from closer organization in Michigan. Perfected traffic arrangements have done wonders to wipe out difficulties between connecting companies.

"Now," he continued, "we are ready to reach out and make agreements with neighboring States along the same lines. Need of organization is also necessary from a moral standpoint. A case in evidence is that of an Independent company of Michigan, having a capital of $100,000 and paying a dividend of 8 per cent., which made arrangements that brought it under the control of the Bell company. There was no need for this deal. The company was in a first-class condition and had no financial difficulties. Had we been organized in a central body when this occurred and looked squarely into each other's eyes this arrangement would never have been made."

An Organization Committee.

On a motion by Mr. Hoge and seconded by Mr. T. B. Lee, Pittsburg, Pa., chairman, the following committee was appointed to perfect plans of organization: J. B. Hoge, Cleveland, Ohio, Chairman; C. W. Kleine, of Pennsylvania; H. Linton Reber, St. Louis; J. B. Earl, Waco, Texas; E. B. Fisher, Grand Rapids, Mich.; Edward L. Barber, Toledo, Ohio, and Cyrus Huling, of Columbus, Ohio. The meeting then adjourned.

MANUFACTURERS AND SUPPLY DEALERS PRESENT

THE following is the list of manufacturers and supply dealers at the convention, together with their representatives:

The American Electric Telephone Company of Chicago was represented by P. C. Burns, J. G. Ihmsen and S. J. Baer.

President W. E. Doolittle, represented the Sterling Electric Co., of Lafayette, Ind.

Thomas W. Finucane, W. C. Stiger and J. D. Cracraft represented the Stromberg-Carlson Telephone Manufacturing Company of Chicago, Ill., and Rochester, N. Y.

The Crawfordsville Wire & Nail Co., Crawfordsville, Ind., was represented by R. Schweitzer.

The Swedish-American Telephone Co. of Chicago was represented by J. A. Russell, A. V. Overshiner and T. Lundburg.

The Dean Electric Co. of Elyria, Ohio, represented by W. W. Dean and A. E. Barker.

Frederick Greer, president, looked after the interests of Harvard Electric Company of Chicago.

W. H. Cram, A. J. Rousseau, J. F. Crook, Harry Durant, James Strasberg and G. L. Fisher represented the Automatic Electric Co. of Chicago.

A. L. Waterbury and C. M. Ripley of the American Conduit Company.

L. G. Le Bouveau represented the Ewing-Merkle Co. of St. Louis.

Carl Seyler represented Hubbard & Co. of Pittsburg.

W. H. Trimm and J. C. Hubacher represented the Monarch Telephone Mfg. Co. of Chicago.

J. S. Cuming, C. H. Wallace, J. A. Becker, J. P. Poertner represented the Central Telephone & Electric Co. of St. Louis.

F. G. Jones, James A. Kenny, W. W. McNeal of the American Electric Fuse Company of Chicago.

F. W. Pardee and F. R. Parker represented Frank B. Cook of Chicago.

W. P. Bowman and A. B. Conover represented John A. Roeblings' Sons Co. of Trenton, N. J.

E. P. Baird, Baird Mfg. Co. of Chicago.

W. E. Wetzel, Measured Service Co., Chicago.

Charles North, Frank Sapp, A. B. Kratz, North Electric Co., Cleveland.

W. A. Caldwell, J. B. Wiley, Standard Underground Cable Co., Pittsburg.

John C. Roff, Wesco Supply Co., St. Louis.

F. E. Donohue, American Electric Works, Providence, R. I.

H. D. Stroud, Controller Co. of America, St. Louis.

F. H. Medhurst, F. N. Reeves, Arthur Kneisel, Faller Automatic Telephone Co.

Ewing-Merkle Electric Co.: W. G. Brown, L. G. Le Bourveau, J. S. Arthur, W. J. Kennedy, A. B. Ewing, Jr., W. G. Simms, L. G. Kallock.

Wesco Supply Co.: J. W. Krueger, V. Eraggio, W. E. Eckloff, L. M. Zapp.

Kellogg Switchboard & Supply Co.: Franz G. Dommerque, secretary and general manager; F. V. L. Turner, J. C. Lewis, W. H. Hind, H. N. Farris.

Telephone Hygienic Company, represented by President Horace L. Cutter.

H. D. Kusel was in charge of the display of the Baird Manufacturing Co.; E. M. Deems, representing the Gordon Battery Co., of New York City; Frank B. Cook was on hand talking "Cook protectors"; G. H. Johnson represented the Western Telephone Manufacturing Co., of Chicago.

Among the delegates were: J. H. Bell, Salem, Ind.; A. A. Whitney, Mt. Gilead, Ohio; N. E. Watts, Staunton, Va.; Albert Schulter, Streator, Ill.; John F. Baldwin, Irontown, Mo.; C. A. Schock, Sherman, Texas; G. T. McQuillan, Lexington, Miss.; T. B. Lee, Pittsburg, Pa.; J. B. Earle, Waco, Texas; Edward Rotau, Waco, Texas; O. F. French, Cleveland, Ohio; H. T. Dalrymple, Mt. Gilead, Ohio; B. B. McMeal, Chicago; Wm. A.

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Hopkins, Jr., Columbus, Ohio; P. J. Wenich, Monroe, Wis.; C. E. Nicholas, Columbus, Ohio; Dwight E. Zapp, Mt. Vernon, Ohio; C. Y. McVey, Cleveland, Ohio; L. F. Blasingam, Hawkinsville, Ga.; O. C. Snider, Kansas City, Mo.; Frank L. Beam, Columbus, Ohio; C. H. Judson, Council Bluffs, Ia.; L. W. Stanton, Cleveland, Ohio; C. W. Kleine, Trenton, N. J.; Maxime Reber, St. Louis, Mo.; E. Land, Grand Rapids, Mich.; C. J. Baer, Topeka, Kans.; Edward L. Barber and James E. Brailey, Wauseon, Ohio; Virgil Bunton, J. W. Sidener, John Wallas, and Ira J. Baker, of the Lebanon, Ind., Independent Telephone Co.; Lee Henry, New London, Ind.; C. E. Stinson, Home Telephone Co., Toledo, Ohio; Guy Walks, Newark, Ohio; James McClamrock, Frankfort, Ind.; N. W. Karrenbock and J. B. Greensfelder, of Clayton, Mo.; F. R. Parker, of Chicago, Ill.; N. E. Liggett, Marysville, Ohio; Paul Latzke, of New York City; M. R. Nyman, of Chicago; THE AMERICAN TELEPHONE JOURNAL; C. L. Brown, Aberdeen, Kansas; E. Fledderjohann, Logan, Ohio; J. C. Meyers, Degraff, Ohio; D. C. Yoder, Toledo, Ohio; P. E. Allison, Atlanta, Ga.; George N. Methany, Lima, Ohio; William Van Middlesworth, Racine, Wis.; Kempster B. Miller, Chicago, Ill.; F. M. Flesk, Piqua, Ohio.

MANUFACTURERS' EXHIBITS

None of the manufacturers had exhibits at the hotel. Those having exhibits in the Electricity Building, World's Fair, made special arrangements to receive delegates.

THE CENTRAL TELEPHONE & ELECTRIC COMPANY.

The booth of the Central Telephone & Electric Company in charge of President Cuming and C. H. Wallis, who extended their courtesy to the visiting delegates, has a very attractive exhibit of the various types of telephones and apparatus which the company manufactures, and which are displayed in such a manner as to attract the attention and commendation of all visitors.

THE CONTROLLER COMPANY OF AMERICA.

H. D. Stroud and Mr. Mahon represented the Controller Company of America at its booth in the Palace of Electricity. This company has a practical demonstration of its system in operation, and has also supplied the Kinloch Telephone Company of St. Louis with Stroud collectors, which are in use throughout the Fair grounds.

THE AUTOMATIC ELECTRIC COMPANY OF CHICAGO, ILL.

The Automatic Electric Company of Chicago has a most attractive display of its apparatus in its booth. It consists of a section of a 10,000 capacity board, 200 stations being installed. The exhibit is in charge of H. D. Critchfield, J. F. Crook, H. A. Rousseau, H. S. Durant, G. L. Fisher and James Strasburg.

FALLER AUTOMATIC TELEPHONE COMPANY OF NEW YORK.

The exhibit of the Faller Automatic Telephone Company was in charge of F. H. Medhurst, F. N. Reeves and Arthur Kneisel.

EWING-MERKLE ELECTRIC COMPANY OF ST. LOUIS.

At the booth of the Ewing-Merkle Electric Company of St. Louis, W. G. Brown, L. G. Le Bourveau, J. S. Arthur, W. J. Kennedy, A. B. Ewing, Jr., W. G. Simms and S. G. Kallock received visitors.

WESCO SUPPLY COMPANY OF ST. LOUIS.

At the exhibit of the Wesco Supply Company in Block B a very attractive display of apparatus is shown in charge of J. W. Krueger, V. Eraggio, W. E. Echoff, L. M. Zapp.

KELLOGG SWITCHBOARD AND SUPPLY COMPANY OF CHICAGO, ILL.

Franz J. Dommerque, secretary and general manager of the company, together with F. V. D. Turner, J. C. Lewis, W. M. Hind and H. N. Farris, had charge of that company's exhibit.

THE AMERICAN ELECTRIC FUSE COMPANY.

The American Electric Fuse Company was represented by Frank B. Jones, James A. Kenny, W. W. McNeal. This exhibit was very attractive and drew much approbation from the delegates.

THE TELEPHONE HYGIENIC COMPANY.

The Telephone Hygienic Company was represented by the president, Horace L. Cutter, and has for display some ingenious hygienic attachments used in connection with telephone apparatus.

W. N. MATTHEWS & BRO. OF ST. LOUIS, MO.

W. N. Matthews & Brother had a very attractive display of Stombaugh Guy Anchors in Section 8 of the Electricity Building.

THE LECLANCHE BATTERY COMPANY OF NEW YORK.

The Leclanche Battery Company of New York exhibits its celebrated "Gonda" batteries, of which it has several different types.

WESTON ELECTRICAL INSTRUMENT COMPANY OF WAVERLY PARK, N. J.

The Weston Electrical Instrument Company has one of the most expensive booths in the Electricity Building. The display of the apparatus includes portable measuring instruments of all descriptions. C. P. Frey is in charge.

THE STANDARD UNDERGROUND CABLE COMPANY OF PITTSBURG, PA.

The Standard Underground Cable Company has a most attractive and unusual exhibit in conjunction with the McRoy Clay Works. This exhibit shows a section of underground conduit construction illustrating the methods of building, also pulling-in cable and the manhole construction.

NATIONAL CARBON COMPANY OF CLEVELAND, OHIO.

National Carbon Company of Cleveland exhibits a complete line of both dry and wet batteries, including the largest dry battery ever constructed. Various types of carbons, battery plates and other pieces of apparatus which are made of carbon are shown.

AMERICAN CONDUIT COMPANY OF CHICAGO, ILL.

The American Conduit Company has an exhibit of subway construction which illustrates its bituminized fiber conduit. This exhibit is in charge of C. M. Ripley, who is always ready and willing to give all the information desired about this type of underground construction.

BAIRD MANUFACTURING COMPANY OF CHICAGO, ILL.

The Baird Manufacturing Company has on view a complete line of pay-station apparatus, time stamps, call registers and peg counters. This exhibit is very attractive and illustrates very fully the extent of use to which the pay station has been brought.

ELECTRIC STORAGE BATTERY COMPANY OF PHILADELPHIA, PA.

The Electric Storage Battery Company exhibits a very complete line of chloride accumulators, together with a map which shows the location of its installations throughout the United States.

KESTER ELECTRIC MANUFACTURING COMPANY OF CHICAGO, ILL.

The Kester Electric Manufacturing Company has an unusual feature in connection with its exhibit in the shape of a clock made entirely of ordinary pins joined together by means of Kester self-fluxing solder. This clock is run by electricity and furnishes an illustration of ingenuity and painstaking care.

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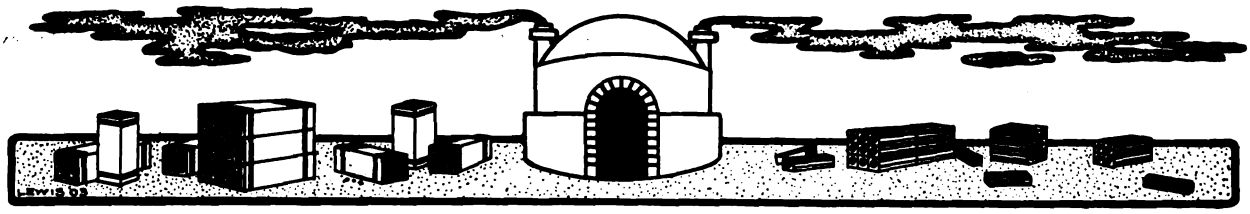

THE TELEGRAPH, TELEPHONE AND CABLE IN WAR

Paper Presented at the International Electrical Congress at St. Louis

By Samuel Reber, Major, General Staff, U. S. A.

"WAR," says Von Moltke, "is the only science that lays under tribute all the other sciences." The great discoveries and advances in science made during the past century have been utilized in the art of war, and none, with the possible exception of steam, has produced a greater change in the application of its principle than the use of electrical means of communication. The saving of time, and subsequently money, by the use of the telegraph, the telephone, and the cable in the affairs of daily life has been beyond calculation. The use of electrical means of communication is now absolutely necessary to success in war, not only in the grand strategical combinations of a campaign, but also in the varying tactical situations on the field of battle.

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The element of time is one of the dominating factors in modern warfare with the enormous expense incident to the equipment, maintenance, supply and movement of large fleets and armies. The longer the duration of a war, the greater the strain of the physical and financial resources of the nations involved. The ultimate result of a war may depend on the financial capacity of a nation to pay, feed and supply a victorious army. War disturbs not only the normal internal conditions of belligerent nations, unsettles and frequently paralyzes their trade, industrial and agricultural prosperity, but also produces a far-reaching result on the commerce of the world.

Nations are now so intimately connected by business and fiscal ties that the effects of a war are quickly felt in the markets of the world. Although business may be stimulated for a while by a war, the ultimate effect must be one of depression. The exhaustion of the resources of one of the family of nations, caused by a protracted war, is felt to a greater or less degree by all the others. Anything which tends to shorten the duration and limit the sphere of a war is a decided gain, not only to the belligerents involved, but to the world at large. Electricity with its space and time annihilating properties has proved an ideal agent in shortening the duration of wars.

Napoleon in one of his maxims of war has said: "Le secret de la guerre est dans le secret des communications." It is absolutely necessary for the commander of an army to have rapid and positive means of communication for the transmission of orders, instructions and information from his extreme outposts in contact with the enemy back to his base in the rear of his army, and with all independent commands engaged in the theatre of operations.

The development of the use of the telegraph, telephone and cable in war has been along lines similar to those of commercial practice. The engineering principles are the same, but the operative conditions are, of necessity, more exacting and difficult. Efficiency and certainty of operation under all conditions are the fundamental principles governing design. Cost of installation and economy of operation are of less importance than absolute continuity of service. It is not to be understood, however, that due regard should not be paid to cost of installation and main-

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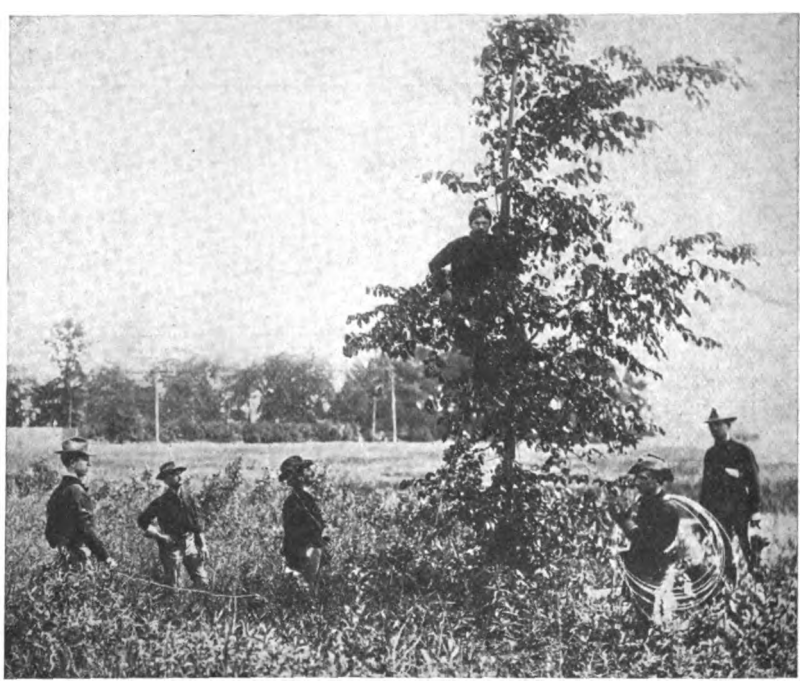
tenance, but commercial methods fail under the stress of war conditions. A large number of ingenious methods and apparatus have failed on account of delicacy of operation or complication of design. Any apparatus that can not stand lack of attention and skilled supervision, exposure to weather, rough handling in transportation, and the effect of the blast of heavy guns, can not be relied on at the critical moment of its use in actual battle. Portability, simplicity and mechanical strength are essential requisites of all apparatus used in the service of field communication. The demands of a fortress system of communication are not as exacting, while the installation and operation of military cables follows the commercial practice of the nations using them.

It is impossible in the scope of a single article to give the characteristic features of the systems and apparatus employed by the various nations for military purposes, or the organizations of their special technical troops. With the exception of the United States, all the great military powers of the world control the service of electrical communication in time of peace as part of their civil establishment. Experience has proved that in time of war and especially in the field of active operations, this service must be part of the military establishment. All the great nations have special technically trained troops to operate their military systems. The operation of a system by joint civil and military control has proved a failure in the past, and the experiment will probably never be repeated.



Constructing a Line Through Difficult Country.

The service of communication is, in general, separated into field and fortress work. The fortress system consists of the permanent lines, usually underground, connecting the various works in the line of circumvallation around fortified positions, and in seacoast works, the system of fire control and direction for the laying and training of the haevy batteries, rapid-fire guns protecting the mine fields, and the searchlights. The details of such systems are zealously preserved as governmental secrets for obvious military reasons. For armies operating in the field a complete chain of communication should exist from the outposts in touch with the enemy back to the capital of the nation, or the main base of operations, which is connected to the seat of government by permanent lines. In case of over-sea operations the base is connected by cable.

Depending on the construction used, the chain of communication is usually divided into three parts, permanent, semi-permanent, and temporary, or flying lines. Permanent lines are usually those existing in the country or are built after the army has advanced. They are ordinarily outside of the zone of active operations, their construction following the usual engineering methods. When taken possession of and operated by the army the methods used are those of established commercial practice. Semi-permanent lines are used to connect the principal bases or depots of supplies on the edge of the zone of operations with the field bases within it, and the general headquarters. Field or flying lines are used in the zone of active operations and connect the general headquarters with all the principal subdivisions, even to the extreme outposts. In this service expedients of rapid construction of every nature are employed, and the telephone is fully utilized. It is possible to construct a line, using lances of ash or bamboo to support the wire, at the rate of from one to three miles an hour, depending on the character of the ground. By the use of light field cable and bare wire a detached cavalry column, or even a reconnoitering party, can be connected during its movement with the main body. At night each brigade and division headquarters can be connected by a field telephone system with the corps headquarters and the supply points, while the extreme outposts can instantly report any movements on the front. On the field of battle the commanding general can be connected telephonically with his corps commanders, and they in turn with their division and brigade commanders.

Major Von Etzel, of the Prussian army, first suggested in 1839 to the War Department the possibility of employing the electrical telegraph, but it was not until 1844 that a board of officers was convened to consider this subject, and not for several years subsequent to that date was the necessary material obtained and a line built. There is no record of the result of this experiment. In 1853, during the manœuvres of the Austrian army at Olmutz, a movable telegraph line was constructed by stationing men at intervals to hold light lances to support the wire. Naturally the result wa snot considered successful.

The first practical application of the telegraph was during the siege of Sevastopol by the allied armies in 1855, where the searchlight was also first tried, the current for the arc being supplied by primary batteries. The dynamo was not used in searchlight work until the siege of Paris in 1871, where it was employed by the Germans, the French using primary batteries for the arc. During the siege of Sevastopol the lines were of permanent character and were not used for tactical purposes.

The development of the military telegraph system of the English army appears to have progressed quite slowly at first, as its importance does not seem to have been recognized by the authorities. When the Ashantee war of 1873 broke out no field telegraph material existed in the army, and none reached the troops in the field until they were well into the interior. When the supplies were received they were both insufficient and unsuitable, but assisted in hastening the termination of the war. Again in the Zulu war in 1879 no provision seems to have been made at the beginning of the campaign. Better use of the telegraph was made in the Afghan campaign of that same year in the face of great difficulties of operation caused by the constant cutting of the lines of the enemy. In 1881 Major Cardew introduced the telephone as a receiver for telegraph purposes, using a buzzing note produced by an interrupted current for transmitting Morse characters. This system has been modified and extensively used with great success in our own service.

The buzzer, as it is called, is simply a coil of low resistance and high self-induction in circuit with a telegraph key, an interrupter and a few cells of dry battery. On opening the circuit

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the discharge from the coil goes to the line, and owing to the high self-induction and consequent comparatively high e. m. f. enough current reaches the other end of the line to give audible signals. By the use of the buzzer leaky and broken lines which would be absolutely grounded for ordinary Morse working can be operated. Major Cardew's system was first used in the Egyptian campaign of 1882. The telegram announcing the result of Tel-el-Kebir was sent from the battlefield by this system.

Profiting by their previous experiences, about which an English writer of high authority in 1894 naively said, "Some ill-luck seems to have attended our telegraph arrangements on service," the British had a completely equipped and supplied telegraph organization in the field during the recent Boer war in South Africa. Some 220 separate field cable-lines of 3,749 miles in lenth, and 2,191 miles of aerial line were constructed by them, the traffic on some of their main trunks being so heavy that they used Wheatstone automatic instruments. The telephone was also extensively used. The defense of Ladysmith was conducted entirely by telephone, and it was said that the telephone system saved the place when the Boers attacked Wagon Hill and Caesar's Camp on January 6, 1900. To protect their long line of communication against the raids of the Boers, blockhouses were built at intervals of about one thousand yards and every second or third one supplied with a telephone connected with centers for the dissemination of information and for the obtaining of succor. Certain of the blockhouses were supplied with telegraph instruments in addition to the telephone. "The blockhouses together with the systematic 'drives' organized by the Commander-in-Chief finished the war, as the Boers themselves confess."

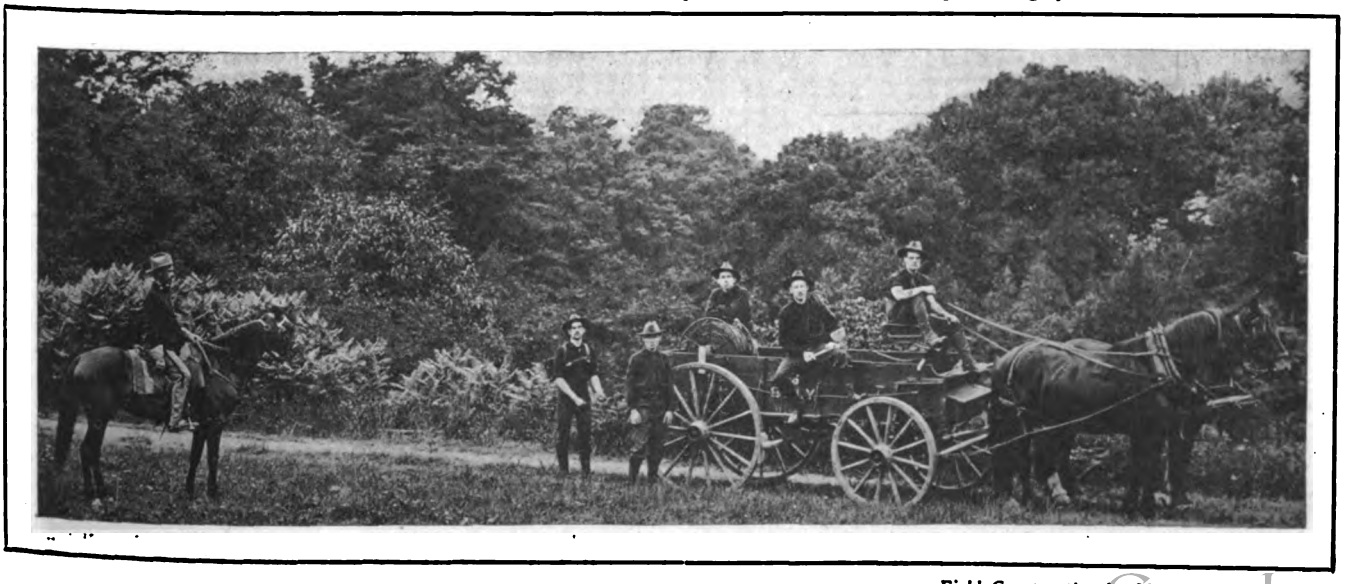
In the Spanish-American war, though of short duration, the telegraph, telephone and cable played a most important part, both strategically and tactically. In the operations in front of Santiago the telephone was used to connect the trenches along the thirteen miles of front. The bombardment of Santiago was directed by telephoning from the front to the shore where range and direction were flagged to the fleet. The operations are summed up in the following extract from the official report of the Chief Signal Officer for 1898:

> The major-general commanding the Fifth Army Corps reached by telephone points on the right, center, and left of his line within 400 yards of the enemy, and left of his line within 400 yards of the enemy, and communication with his subordinate commanders was not only possible at all times, but was continuously maintained, as there lines worked twenty-four hours in the day. On the other hand, the major-general commanding the Fifth Corps was able to communicate directly with the admiral commanding the fleet through the telephonic station near Aguadores. In addition, the War Department, with all its bureaus and the supply depots of a great nation, were within twenty minutes of the general commanding, so that any deficiencies of equipment could be asked for or reinforcements requested; and further, he was able to keep in touch with the President, the Secretary of War, and the Commanding General of the Army, so as to receive at critical moments such advice, encouragement, or assistance as might advance the interests of the campaign.

In the Porto Rican campaign every part of the widely distributed invading army was connected by telegraph and telephone from the first day of landing at Guanica to the termination of the war. The telegraphic and telephonic service was such that within 33 minutes after the receipt of the cablegram announcing the armistice which suspended hostilities the commanders of three separate divisions of the army operating in different parts of the island miles apart were ordered to suspend operations. In the case of two of the commands the message arrived just in time to prevent actual contact as the troops were in position for action, and at Guayama the lanyards stretched on the guns to open the artillery duel. In the Philippine campaign and the subsequent insurrection the telegraph and telephone were of great value, so much so, that the Commanding General remarked in 1901, "It is not too much to say that in the absence of this efficient service it would be impossible to hold this archipelago with less than 150,000 men, which is now well and efficiently held by 60,000." During the insurrection some 4,851 miles of aerial line were constructed and 500 miles of submarine cable laid.

In the present war between Russia and Japan it can be inferred from the meager published reports of the operations that both sides are using electrical means of communication to their full extent. It is known that the Japanese armies are connected together by a system of field lines, their outposts by telephone and their bases with Chemulpo and Japan by cable. On the day before the battle of the Yalu the fire of the Japanese howitzer batteries was controlled and directed by telephone, and on the day of the battle during the movement of the 12th Division its commander was continuously connected by telephone with the Commanding General of the Japanese forces. The value of wireless telegraphy to the Japanese navy in its operations in the China seas, and to the Russians by allowing the commander of a beleaguered place to communicate with his home government is too obvious for comment. It seems at the present state of the art that wireless telegraphy will not play as important a part in land communications as the telegraph or telephone until the present methods of its operations have been greatly improved upon.

The part played by the cable in the history of recent years has completely proved that its role is scarcely inferior to the military and naval forces themselves. All the colonial powers of the world have so arranged their means of cable communications that the cables are under their immediate control and touch only the shores of their own possessions or those of countries that are allied to them by treaty and community of interest. The control of the seas, one of the material elements contributing to the power and prosperity of a nation, is influenced largely by cable communications, and in a war in the future between two naval powers the result will depend largely on coal and cables.



Field Construction by Means of Wagon.

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TELEPHONY AT THE ELECTRICAL CONGRESS.

ONE of the most valuable features of a great exposition is the opportunity "to talk things over." Visitors from all parts of the world are attracted by the exhibits, and on a common meeting ground the interchange of views and experiences of those whose tastes and avocations are similar is natural and inevitable.

In one respect the Electrical Congress held in St. Louis last week was unique—that is, in the attention given to subjects telephonic. This is partly due to the enormous extension which this means of intercommunication has received during the past decade, but, we believe, that the broad and open policy so generally advocated by Independent telephonists has been even a more potent factor, and now results in breaking down the short-sighted policy of secrecy with which the Bell interests have for so long endeavored to surround the telephone. The business of telephony is too complicated to be comprehended by any man, or even any set of men. It is so kaleidoscopic in nature that it must be viewed from every side of human life.

The telephone was one of the first of the discoveries which has produced the great electrical era of the past twenty-five years, but it has been outstripped both by the electric light and the electric railway. And why? Owing, we believe, very largely to this same policy of secrecy. Our friends of the electric light and the street railway long ago perceived that a free and frank interchange of experience and opinion was the surest way in the long run to develop business upon a broad and sound basis. For any one discovering something particularly new and useful there was the patent office standing ready to afford ample protection, and if the matter was not worth patenting it certainly was not worth secrecy.

Before the congress there were read half a score or more of papers upon subjects purely telephonic, all of which will bear the most careful perusal, and will be of the greatest value to the manager and operator as representing, upon the topics presented, the views of the best telephonists of the world. Many of these papers deal with the most vital of telephonic problems that now occupy attention, and they are treated with the most refreshing frankness.

In our previous issue a number of the papers were reproduced, while the balance appear in the current number. Mr. Kempster B. Miller discusses the problem of "The Automatic *vs.* The Manual Exchange." With his usual clear-sighted analysis Mr. Miller states that the solution of this problem lies in the answer to three questions: 1st. *Can* an automatic switchboard perform the work of the manual? To this he answers "Yes."

2d. Is the service afforded by the automatic board satisfactory to the subscriber? This is also answered in the affirmative.

3d. Is the expense of the automatic both in initial installation and annual maintenance comparative with the similar costs of the manual? As regards installation costs, Mr. Miller states that the automatic is considerably more expensive, about one-third, while as to annual expense he frankly states that as yet there has been too little experience with the automatic upon which to base a reliable opinion.

"Telegraphy and Telephony in Japan" are treated by Mr. Saitaro Oi. This paper is to all intents and purposes a history of the developments of telephony in Japan, from which it is pleasing to note that during the last twelve years the number of telephone exchanges have increased from 2 to 46, and the number of subscribers from 359 to 36,700.

OPINION OF EXPERT TELEPHONE ENGINEERS.

Dr. Hammond V. Hayes places before the Congress a paper which is a report of the operation of "Loaded Telephone Lines in Practice." From the technical standpoint it would hardly be possible for Dr. Hayes to have selected a topic to arouse more interest, or which would have been listened to with more profound attention by engineering telephonists. The problem of long-distance transmission is undoubtedly the technical telephonic problem of the future.

"The Telephone Problem in Large Cities" is the title of Mr. Dommerque's paper, in which the author rehashes the old question previously thrashed out on many a telephone battlefield, of the proper number of offices, or, rather, of the proper size of office which should be installed.

Prof. J. C. Kelsey, in a paper upon the "Dunbar Two-strand Common Battery System," compares the common battery switchboard circuits which have been adopted by the Bell and the Kellogg companies. The paper is a minute comparison of the two systems and chiefly interesting to the switchboard expert.

"The Theory of Telephone Exchange Development" is discussed by G. de La Touanne. The author enumerates the various items of expense which make up the cost of installation and the cost of operation, and then collects into a formula the various components and shows the method whereby telephone rates may be calculated to provide for operating costs and dividends.

A short paper by Joseph Hollos describes the systems for "Simultaneous Telephony and Telegraphy" which have been adopted by the Hungarian telephone department.

In Australia it has been found that aerial lead cables were exposed to considerable danger from the attacks of certain predatory insects. Mr. John Hesketh, under the title of "New Danger to Lead-Covered Cables," describes the ravages which these pests have wrought, and indicates some methods of protection.

In a paper entitled "High Frequency Telephone Tests," Dr. Kennelly describes some new methods of measuring telephone lines which will be of marked interest to both the student of mathematical telephony, from the theoretical aspect, and to the cable man, as outlining a method whereby tests on the wire plant, confined hitherto by reason of complexity to the laboratory, can now be made in the field. Dr. Kennelly's plan involves the use of the barretter, an invention of Fessenden, which consists of an exceedingly fine bit of platinum wire sealed in a glass tube. If the barretter be placed in series with a galvanometer and battery a steady current will flow, producing a constant deflection. Now if another source of electricity be connected to the barretter a new current will flow through it. This new current will heat the fine platinum wire, change its resistance, and so alter the former deflection of the galvanometer. Dr. Kennelly shows how this extremely sensitive instrument can be made available and valuable in the inspection of cables and switchboards.

Ofttimes the practical man turns up his nose at the scientist, and thinks, frequently with reason, that in its proceedings a congress is merely "talking through its hat." In this instance such is far from being the case. All of the papers deal with live telephone topics, and treat them from the business aspect. Even an hyperbolic cosine is robbed of its terrors by Dr. Kennelly's skill, and the barretter shown to be a simple, easily managed instrument, capable of great service to the wire chief and cable man. In all respects THE AMERICAN TELEPHONE JOURNAL aims to be practical, and the congress papers are reproduced in full because we believe that no practical man can afford to be without them.

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HIGH-FREQUENCY TELEPHONE CIRCUIT TESTS

Paper Presented at the International Electrical Congress at St. Louis

By Dr. A. E. Kennelly, *Harvard University.*

In land-line telegraphy, it has for many years been a custom to test the circuits periodically by applying a steady assigned voltage to their sending ends, and measuring the strengths of current received to ground at their distant ends, through a milliammeter or equivalent apparatus.[1] Fig. 1 shows this well-known arrangement. An e.m.f. E volts is applied to the end A of a line L miles or kilometers in length, and the current-strength i is observed at B, passing to ground through the instrument of resistance R ohms.

It is known that for a uniform line of conductor-resistance r

$$i_r = \frac{E}{R_0 \sinh(La) + R_r \cosh(La)} = \frac{E}{R_1} \text{ amperes} \quad \ldots\ldots (1)$$

where[2]

$$R_0 = \sqrt{\frac{r}{g}} \quad \ldots\ldots \text{ohms} \quad (2)$$

$$\text{and } a = \sqrt{rg} \quad \ldots\ldots \text{per mile or kilometre} \quad (3)$$

ohms per mile or kilometer, and of leakage conductance g ohms.

The resistance R_r, represented by the denominator of the fraction in formula (1), may be called the "receiving-end-resistance" of the circuit; because it is the resistance which the circuit apparently offers to the applied e.m.f., E, as judged by an observer at the receiving end. If the maximum available e.m.f. at the sending end is, say, 200 volts, and the minimum received current-strength at the receiving end of the line which will operate the signalling relay is, say, 1 milliampere; then the "receiving-end-resistance"

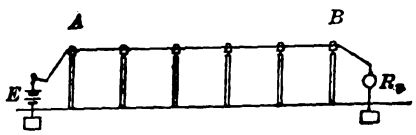

Fig. 1.—Telegraph circuit test.

of the line must not exceed 200,000 ohms in order that the received current in the steady state may suffice to produce a signal. During the variable states of rapid signalling, the effective "receiving-end-resistance" of the circuit may differ appreciably from that of the steady state. Nevertheless, the steady receiving-end-resistance furnishes a useful and reliable criterion as to the workable condition of the circuit. When the steady receiving-end-resistance of any such circuit exceeds some particular limit, the circuit becomes unworkable and requires the lineman's attention.

As an example of formula (1) the case may be considered of a uniform telegraph line, 345 kilometers long, having a conductor resistance of 15 ohms per kilometer, and an insulation leakance of 1 microohm per kilometer (corresponding to an insulation resistance of 1 megohm-kilometer). An e.m.f. of 80 volts is applied at A. What current-strength will flow to ground B: (a) when grounded directly, (b) when grounded through a measuring instrument of 32 ohms resistance? Here $L = 340$; $r = 15$; $g = 10^{-6}$; $E = 80$. $R_r = 0$ in (a) and 32 in (b).

By (2) $R_0 = \sqrt{\frac{15}{10^{-6}}} = 3873$ ohms, the sending-end-resistance for an indefinitely long line.

By (3) $a = \sqrt{15 \times 10^{-6}} = 0.003873$

$La = 340 \times 0.003873 = 1.317$; $\sinh La = 1.7321$; $\cosh La = 2.007$.

$\therefore$ by (1) $i_r = \frac{80}{3873 \times 1.7321} = \frac{80}{6708} = 0.01193$...amperes in (a)

and $i_r = \frac{80}{3873 \times 1.7321 + 32 \times 2.007} = \frac{80}{6772} = 0.0118$ amperes (b)

The receiving-end-resistance of the line would be 6708 ohms in case (a) and 6772 ohms in case (b).

In the case of a telephone circuit, precisely similar formulæ apply.[3] The conditions are, however, rendered more complex, because instead of a steady current system (frequency = zero) we have a multi-frequency alternating-current system. Each frequency of alternating current obeys the formula:

$$i_r = \frac{E}{Z_0 \sinh(La) + Z_r \cosh(La)} = \frac{E}{Z_1} \text{ amperes} \quad (4)$$

where

$$Z_0 = \sqrt{\frac{r + j l\omega}{g + j c\omega}} \text{ ohms,} \quad \text{the sending-end-impedance} \quad (5)$$

$$a = \sqrt{(r + j l\omega)(g + j c\omega)} \quad \ldots\ldots \quad (6)$$

n = frequency — cycles per second.

ω = angular-velocity = $2\pi n$ radians per second.

r = conductor-resistance — ohms per loop mile or kilometer.

l = conductor-inductance — henrys per loop mile or kilometer.

g = dielectric-conductance — mhos per loop mile or kilometer.

c = dielectric-capacity — farads per loop mile or kilometer.

$j = \sqrt{-1}$

E = effective harmonic e.m.f. at A or maximum $/\sqrt{2}$ volts.

i_r = effective harmonic current at B or maximum $/\sqrt{2}$ amperes $\angle$

Z_1 = receiving-end-impedance or maximum ohms $\angle$

Z_r = impedance of receiving apparatus or maximum ohms $\angle$

In order, therefore, to test a telephone circuit for effectiveness, it is only necessary to apply a known effective sinusoidal e.m.f. at A, and to measure the corresponding current strength received at B. The ratio of these quantities will be the "receiving-end-impedance" of the circuit at that frequency. If this impedance exceeds a certain value, assignable for each particular circuit, the circuit will be defective or even inoperative, and will require to be overhauled. It is, moreover, highly probable that the limiting length of circuit over which telephony is commercially possible is that which has a certain definite receiving-end-impedance at a certain standard sinusoidal frequency, whether the circuit is overhead, or underground, mixed, loaded, or natural, and after variations in sending-end-impedance have been taken into account.

It is not, of course, necessary that the measurements shall be made with a simple harmonic, or sinusoidal e.m.f. A mixed frequency or complex harmonic e.m.f. may be used. In that case, however, although the results will be comparable with each other, and with a certain empirical standard, they will cease to be interpretable or checkable by formula (4).

The object of this paper is to describe certain apparatus constructed for the purpose of measuring the alternating-current strength, at telephonic frequencies, received at the distant end of a telephone circuit, with a definite e.m.f. impressed on the sending end. The apparatus, therefore, is one which enables the receiving-end-impedance of a circuit to be measured for a given frequency, or enables that routine test to be made for telephone circuits which has so long been well known for telegraph circuits.

The receiving instrument in such a test should either have negligible impedance, or an impedance of magnitude similar to that of an ordinary receiving apparatus. There is no difficulty in producing an electrodynamometer of sufficient sensibility to enable a telephonic current-strength to be measured under laboratory conditions, but such an apparatus has relatively large inductance, and at a frequency of 1000 ~, such inductance develops 6283 ohms reactance per henry, while formula (4) shows that this impedance is multiplied by the hyperbolic cosine of the attenuated-length

1. *"On Testing by Received Currents"* by H. R. Kempe. *Journal* Soc. of Tel. Engrs. Vol. IX, pp. 222-231 (1880).

2. *"On Electric Conducting Lines of Uniform Conductor and Insulation Resistance in the Steady State"* by A. E. Kennelly. Harvard Engineering Journal, May, 1903.

3. *"A Contribution to the Theory of Telephony"* by A. E. Kennelly. *"Electrical World,"* Vol. XXIII, No. 27, p. 208, February, 1894. *"The Electrician,"* Vol. XXXIII, No. 841, p. 232, June 29, 1894.

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$L.r$ in producing its effective share in the receiving-end-impedance of the circuit.

The device selected for the purpose (with Prof. Fessenden's permission) was the "solid barretter" used in the Fessenden system of wireless telegraphy. This consists of a minute loop of very fine platinum wire or filament. Out of several sizes of platinum filament tried, the size which gave the best results has a diameter of about 1.7 microns ($1.7\ \mu = 0.0017$ mm$=0.000067''$) and a length of about 1.5 mm (0.06"). The resistance of this filament is about 40 ohms per millimeter, or 1,000 ohms per inch, at room temperatures. Such a filament has a cross-section of 2.27×10^{-9} sq. cms (3.5×10^{-7} sq .in.), and a volume of 3.4×10^{-9} cc. With the specific gravity of 17.5 for platinum, the mass of the filament would be 6×10^{-8} gramme, and with the specific heat of 0.0323 for platinum, one erg of heat, accumulated in such a filament, would suffice to raise its temperature 12.3 deg. C.

To produce a platinum filament of such dimensions, the Fessenden device is seen in Fig. 2. A and B are two brass strips (25 mm $\times$ 6 mm. $\times$ 0.7 mm) pinned, side by side, to a hard-rubber supporting-block rr. Copper connecting wires c, c, are soldered one above. A short v-loop of silver wire b is soldered as a bridge at the lower ends. This silver wire has a diameter of about 0.075

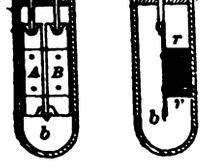

FIG. 2.— FRONT AND SIDE ELEVATION OF BARRETTER.

mm (3 mils), and has a central filament of platinum running through it, like the wick within a candle. The point of the silver v is dipped below the surface of strong nitric acid for a few minutes, and with the aid of a current of some milliamperes from a voltaic cell, the silver is rapidly dissolved away, leaving the platinum filament intact. The process is watched under a microscope, and stopped when the estimated right length of platinum filament has been exposed. The barretter is then protected from injury by being enclosed in a short glass test-tube containing air at the ordinary atmospheric pressure.

In adapting the Fessenden barretter to the telephonic circuit test, the arrangement of Fig. 3 was employed. Here the barretter b is made one arm of an *inductive* Wheatstone bridge. X, X, are two similar coils of low temperature-coefficient-resistance wire, wound upon closed magnetic circuits of steel wire, so as to have each 500 ohms resistance, and a relatively large reactance. A smaller reactance-coil x, of low resistance, of copper-wire winding, was included in the galvanometer branch. The galvanometer G is a wall-pattern d'Arsonval reflecting galvanometer of 620 ohms resistance, with a telescope and a scale at about half-meter distance from the mirror. No attempts were made to secure extraordinary sensitiveness, and 1 mm of deflection in the telescope represented approximately 10^{-8} ampere. The testing battery consisted of two storage cells (4.0 volts total e.m.f). The platinum filament in the barretter had a length of about 5 mm, a diameter of 3 μ, and a resistance of about 125 ohms at ordinary temperatures. Under these conditions a steady battery current of about 6 milliamperes passed through the barretter, raising its temperature some 25 deg. C. A balance at R, aided by a slide-wire r, was secured at about 135 ohms.

If feeble alternating currents are sent through the barretter, superposed upon the steadily testing current, they are practically confined to the arm b of the bridge by the reactances X, X, x, and heat the filament above the temperature due to the testing current. It is shown in Appendix I, that for *small* alternating currents, the change in the resistance of the barretter is proportional to the square of the strength of the superposed alternating current.

As shown in Fig. 3, the barretter b was connected at the receiving end of an artificial telephone cable lent by the American Telephone and Telegraph Company. This artificial cable has a conductor-resistance of 2820 ohms, and a capacity of 1.92 microfarads at 15 deg. C. Its CR time-constant was, therefore, 0.0054 second. The cable represents 32 loop-miles of standard underground cable of No. 19 B & S copper wire (88 ohms and 0.060 mfd. per loop-mile). The electrical length of this artificial cable could be adjusted to even miles. With the condenser c short-circuited, and a balance in R of 130 ohms, loud singing into the transmitter at A, operated by 1 storage cell, or 2 volts, produced a distant deflection on the galvanometer G, representing a received current-strength of nearly 100 microamperes, over the 32 miles of cable. This length represents the limit of "easy commercial" telephonic conversation. As the length of artificial cable in circuit was reduced, the strength of the received current increased, roughly as the inverse square of the length.

It was found practically impossible to obtain steady readings of the current-strength received through the barretter either over different lengths, or even over one and the same length, of the artificial cable, owing to variations in the transmitting apparatus, including the singer. The galvanometer showed that the intensity of the note delivered by the singer could not be steadily sustained for even a few seconds. Moreover, the difference in the effective current at the receiver due to variation in the distance between the lips and the transmitter was very remarkable. The current received, when the lips of the singer were only a few centimeters from the transmitter, was only a small fraction of that received

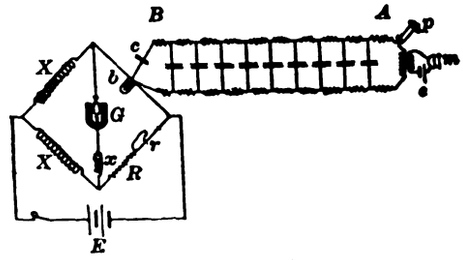

FIG. 3.— CONNECTIONS OF LABORATORY BARRETTER TESTS.

when the lips almost touched the transmitter cone. It was evident, therefore, that the conditions of sound-production at the transmitter would have to be standardized, if consistent and reproducible measurements were to be secured.

A short standard organ-pipe was lent for this purpose by Prof. W. C. Sabine of the Jefferson Physical Laboratory. This pipe sang a fairly pure note of $C''=512\sim$. It was connected by an electromagnetically controlled valve to a small air-holder, which, descending under a constant imposed weight, maintained a nearly constant amplitude of sound at the lips for half a minute at a time. By setting this pipe immediately facing the transmitter, and at a carefully maintained distance therefrom, fairly consistent measurements of alternating-current strength were obtained, with different lengths of cable in circuit. The results are indicated in the curve sheet of Fig. 4. It will be seen that the received-current strengths are roughly proportional to the inverse squares of the lengths of the cable, the inductance of which was negligible. The received current varied from 0.13 milliampere at 32 miles, to 1.16 milliamperes at 13 miles. The dotted line follows the values calculated from equation (4), taking $E=1.74$ volts. It will be seen that there is a rough agreement between the observed and computed current-strengths. The sources of the discrepancy between them were not, however, investigated.

It is evident that the sensibility of the test depends upon the smallness of the filament's diameter, so that it may become heated by a feebler alternating current, and also upon the minimum increase in resistance that can be accurately determined by the Wheatstone bridge. With 3-micron wire this was about 1/700 of 1 per cent. This represented the effect of a telephonic current strength of 23 microamperes. With 1.7-micro wire in air, the limit was reduced to about 7 microamperes, and with the same 1.7-micron wire *in vacuo*, to 3 or 4 microamperes.

Although such degrees of sensitiveness are attainable under

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laboratory conditions, and might suffice for measuring telephonic conversation currents at the receiving end of long circuits, yet the reflecting galvanometer is quite unsuited for routine tests at the switchboard. Any galvanometer that can at present be used under switchboard conditions is much more limited in sensibility. If, however, the limit of resistance change to be detected is increased from 1/700 of 1 per cent. to 1/10 of 1 per cent., the minimum measurable telephonic current-strength becomes about 1/2 milliampere, with 1.7-micron wire in air. This current strength can be supplied over the longest commercial telephone circuits if an effective impressed alternating e.m.f. of about 25 volts be substituted, at the sending end, for the transmitter. That is to say, routine tests using switchboard instruments become quite practicable if a standard 25-volt alternator of telephonic frequency can be applied at the sending end of each circuit to be tested.

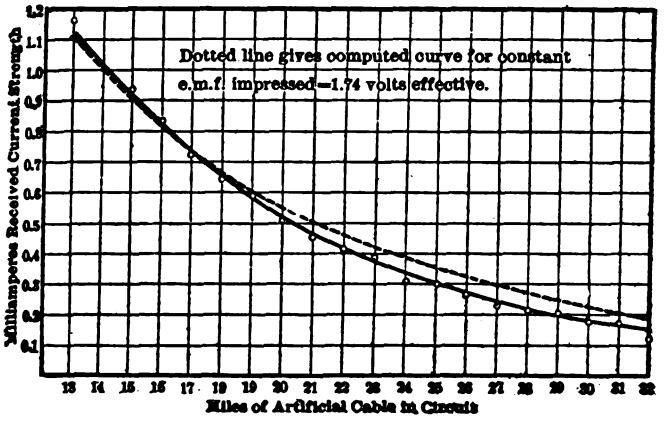

FIG. 4.—CURVE SHOWING RECEIVED CURRENT STRENGTHS AT EACH SUCCESSIVE MILE LENGTH OF ARTIFICIAL CABLE BETWEEN 13 AND 32 MILES.

In order to adapt the apparatus in this manner for switchboard use, a Weston milliammeter, in series with the barretter, was substituted for the reflecting galvanometer and Wheatstone bridge.

The connections of the switchboard apparatus are indicated in

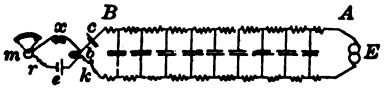

FIG. 5.—BARRETTER AND MILLIAMMETER AT RECEIVING END OF CIRCUIT OPERATED BY ALTERNATOR.

Fig. 5, where *b* is the barretter, with a 2-microfarad condenser in its circuit, to stop the testing current, supplied by the dry cell *e*, from flowing around the telephone circuit; *x* is a reactance coil to stop the telephone current from being diverted through the Weston milliammeter *m*, which gives a full-scale reading at 10 milliamperes over 100 divisions of 1/10 milliampere each. The dry cell *e* has an e.m.f. of 1.45 volts, and an internal resistance of less than 1 ohm. The resistance of the local circuit is adjusted, with the aid of the rheostat *r*, until the full deflection of 10 milliamperes is obtained. This requires 145 ohms in the circuit, of which about 120 are in the barretter, at working temperature, 8.5 in the reactance-coil *x*, 4 in the milliammeter and the remainder, or 12.5, in the dry-cell and rheostat, *r*.

Pressing the key *k* allows alternating current from the source *E* to pass through the barreter, thereby heating it, increasing its resistance, and temporarily reducing the current in the local circuit. Each division of the milliammeter scale represents 1 per cent. of the testing current, and 1/10 of a division or 0.1 per cent. can be readily estimated. A convenient strength of alternating current is one which will reduce the testing current 1 per cent., or one scale division. The action is very prompt and deadbeat, so that the needle's deviation follows at once upon the movement of the key. It is shown in Appendix II, that the strength of the received alternating current is equal to the square root of the needle's deviation in scale divisions, on pressing the key, multiplied by an instrument-constant, depending on the barretter. Thus in the actual instrument, one division of deviation from the full scale reading represents 1.4 milliamperes of superposed alternating current, with shunt multiplier of unity.

The source of standard alternating e.m.f. *E* employed with the switchboard testing-set was a small 12-pole inductor alternator, weighing about 2 kilogrammes, and originally designed for a very different purpose. When belt driven, this little machine could readily deliver a few milliamperes at a frequency of 1200 ~, and, when directly connected to a small motor, 600 ~, The rotor consisted of a laminated inductor cylinder with grooves and polar

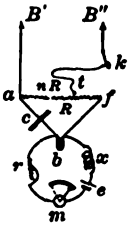

FIG 6.—CONNECTIONS OF BARRETTER HIGH-FREQUENCY MILLIAMMETER FOR TELEPHONE CIRCUITS.

projections. Owing to the peculiar magnetic actions set up during operation, the frequency delivered was very impure. Thus, when running at a speed corresponding to the principal frequency of 1200 ~, there was a prominent undertone frequency of 600 ~ in addition to overtones of 1800, 2400, and higher orders. Moreover, the pressure regulation of this little alternator was very defective, the voltage at terminals varying greatly with the nature and impedance of the circuit to which it was applied. Consequently, although this was the only convenient source of telephonic-frequency e.m.f. available, yet it left much room for improvement. An ideal source of alternating current for these tests

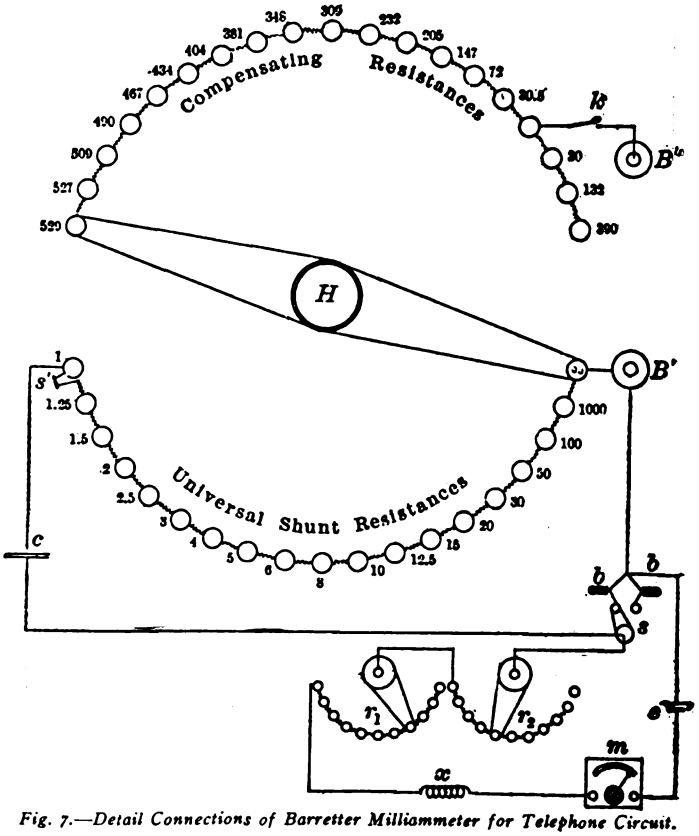

Fig. 7.—Detail Connections of Barretter Milliammeter for Telephone Circuit.

should be simple, reliable, consume little power, having constant freqency and terminal e.m.f. with a pure sine-wave.

Since the 1.7-micron wire melts at approximately 14 milliamperes in air at ordinary pressure (about 2.5 milliamperes *in vacuo*), and the steady testing current is 10 milliamperes, the barretter should fuse when the measured superposed alternating current reaches 10 milliamperes ($10 + j\,10 = 14.14$). Consequently, the barretter must be protected from alternating currents of more than 3 or 4 milliamperes. The theory of Appendix I also shows

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that beyond 2 or 3 milliamperes of measured alternating current, the readings diminish in accuracy unless the formula of the measurement is complicated by the introduction of a correction. It becomes desirable, therefore, to protect the barretter by an adjustable shunt, as shown in Fig. 6. Here R is a resistance of 2000 ohms, permanently bridged across the barretter b and 2-microfarad condenser c. By shifting the contact t, to points distant nR ohms from a, where $n = 1, 1\text{-}2, 1\text{-}3, 1\text{-}4, 1\text{-}5$, etc., successively, the multiplying power of the shunt is made 1, 2, 3, 4, 5, etc., on the principle of the Ayrton universal shunt as shown in Appendix II, for all frequencies of alternating current.

The actual connections employed differ only from those of Fig. 6, by the insertion of compensating resistances in the wire kt, so as to keep the impedance of the apparatus constant under all conditions, and about equal to that of an ordinary telephone receiving apparatus at the testing frequency. In the case considered, the frequency selected was 600 ~, and the constant impedance, including barretter, condenser and universal shunt, 529 ohms. The full connections are given in Fig. 7.

B' B'' are the line terminals, connected to the telephone circuit under test, at its receiving end. H is a double-ended ratchet-switch, bridging diametrically across the two semicircular rows of contacts. The upper contacts are separated by the compensating resistances. The lower contacts belong to the universal shunt.

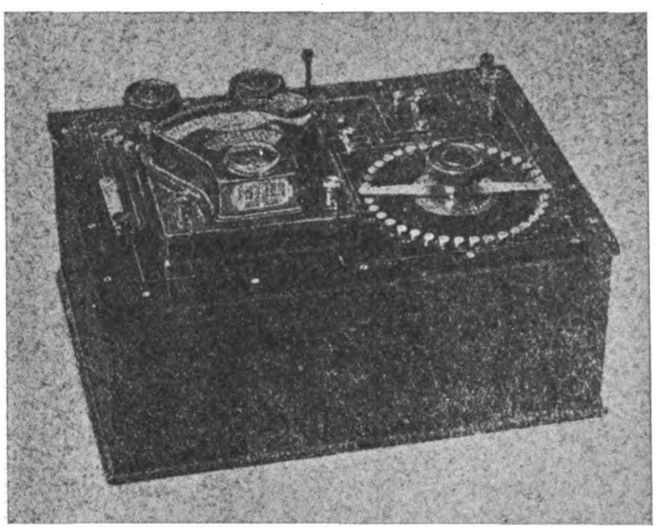

Fig. 8.

In the position shown, the barretter b and condenser c are entirely short-circuited, or shunted with a multiplying-power a; while the impedance of the apparatus, between line binding-posts, is 529 ohms, when the key k is depressed. On turning the handle H clockwise from this initial position, the multiplying power of the shunt is gradually reduced to 1, in 18 steps. By this means the instrument has a theoretical range of measurement from 0.5 milliampere to 4000 milliamperes.

Two barretters b b are installed, under the control of the switch s, one for working, and the other for reserve, in case of accidental fusing. The adjustable rheostats r_1 r_2 of 1/2-ohm and 5-ohm steps respectively, enable the testing current from the dry cell e to be kept constant at 10 milliamperes, except at such moments when the key k is depressed.

A view of the actual form of barretter receiving apparatus, as constructed by the International Instrument Company of Cambridge for the Engineering Department of the American Telephone and Telegraph Company, is seen in Fig. 8.

The process of testing a circuit with this apparatus consists in applying the required voltage and frequency of alternating e.m.f. at the sending end of the circuit, connecting the receiving ends to the line terminals B' B'', adjusting the steady testing current to the precise value of 10 milliamperes, pressing the testing key with the left hand, and turning the handle of the universal switch with the right hand from point to point by rachet, until a suitable small deviation of the needle is observed with the magnifying glass on the milliammeter scale. The square root of this deflection times the shunt multiplying-power, times the instrument constant, gives the effective alternating current in milliamperes received through the 529 ohms impedance in the instrument. From this current, and the applied effective e.m.f., the receiving-end impedance follows at once by Ohm's law. If the impressed e.m.f. is pure, or simply harmonic, this observed receiving-end impedance can be compared with its computed value, for the frequency employed. If the e.m.f. is a complex harmonic, the observed receiving-end impedance can be compared with that similarly observed

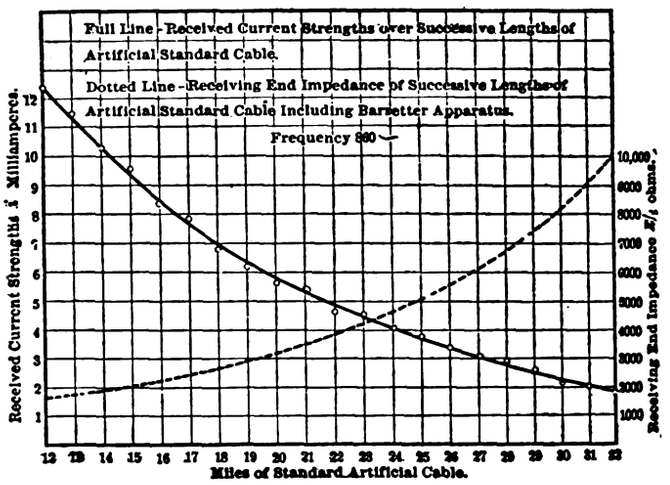

FIG. 9.

on varying lengths of artificial standard underground cable. The comparison will show whether the circuit under test is in satisfactory telephonic condition.

The curves of Fig. 9 show the current-strengths received with the apparatus of Fig. 8 through successive lengths of the artificial standard underground cable above described, and also the corresponding receiving-end-impedance. In this case the e.m.f. E had a magnitude of from 18 to 20 volts, varying with the length of the circuit, and the frequency was 860 ~ with components of 430 ~ and upper harmonics. It will be seen that the received current-strength increased from 1.85 milliamperes at 32 miles to 12.35 milliamperes at 12 miles, and the receiving-end-impedance from 1650 ohms at 12 miles to 10,000 ohms at 32 miles, with the particular frequencies used. With lower frequencies these impedances would ordinarily be less, and with higher frequencies greater.

The following table gives a few measurements made with the apparatus over various looped circuits, the inductor alternator and the barretter receiving apparatus being in the same room, near the switchboard. The frequency was 600 ~ (with 300 ~ and harmonics):

Length of circuit loop. Miles.	Wires. Gauge.	Applied e. m. f. E. volts.	Received current. Deflection divs.	Shunt.	i. Milli. amp.	Receiving end impedance. ohms.
470	8 B. W. G.	5.9	0.5	1	0.99	5,960
470	8 B. W. G.	25	1	3	4.32	5,960
470 + 1 mile ar. cable.	8 B. W. G.	25	0.8	3	3.75	6,985
" " " "	- -	-	1.2	2.5	3.84	6,760
235 + 235 470	8 B. W. G. / 12 N. B. S. G.	24	1.0	1	1.4	17,150
235 + 235 470	12 N. B. S. G. / 8 B. W. G.	20	1.2	1	1.58	19,600
470	12 N. B. S. G.	20	0.1	1	0.449	67,800
35	Art. cable.	25	0.8	3	3.75	7,470
25	Art. cable.	25	0.65	3	3.378	8,250

The experimental research described in this paper was undertaken with the assistance of Messrs. Moses King, Jr., and E. A. Stevens, Jr., senior students in the Department of Electrical Engineering at Harvard, in consultation with the Engineering Department of the American Telephone & Telegraph Company, as represented by Dr. Hammond V. Hayes, Mr. H. S. Warren, Dr. George A. Campbell and Mr. G. W. Pickard.

We also desire to express our indebtedness to Prof. R. A. Fessenden, who assisted us with apparatus, barretter and valued suggestions, as well as to Prof. W. C. Sabine for apparatus and aid.

Appendices will appear in the next issue.

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INDEPENDENT TELEPHONE ASSOCIATION OF PENNSYLVANIA

A CONFERENCE of representatives of the Independent telephone companies of Pennsylvania was held recently at the office of the United Telephone & Telegraph Company in Harrisburg.

There were present at this conference E. C. Wilson, of the Keystone Telephone Company of Philadelphia; J. G. Splane, of Pittsburg and Allegheny Telephone Company; George B. Rudy, of York Telephone Company; B. F. Meyers, of Cumberland Valley Telephone Company; F. E. Wunder, of Keystone State Telephone Company; W. D. Barnard, of United Telephone and Telegraph Company, and H. E. Bradley, of Eastern Traffic Assn.

The preliminaries of a proposed convention of representatives of Independent telephone interests were discussed, and it was concluded to hold the convention in that city on the 27th and 28th of this month, to conclude with a banquet at the Board of Trade on the evening of the 28th.

Papers will be read before the convention by experts on subjects of interest to those engaged in the telephone business as well as to the general public. A large attendance is anticipated and the meeting is expected to give great impetus to Independent telephone enterprises in this part of the country and to bring the various companies into closer relationship.

SIMULTANEOUS TELEGRAPHY AND TELEPHONY

Paper Presented at the International Electrical Congress at St. Louis

By Joseph Hollos.

THE question of simultaneous telegraphy and telephony is not of recent date. While, however, in some places, good results have been obtained in others the advantages reached by this combined using of telephonic circuits are hardly worth mentioning, and in view of the difficulties experienced in the service, it was thought preferable to abandon the scheme.

If we look closer at this question, we can at once observe that wherever the telegraph and telephone services are under the supervision of one and the same interested person, the results obtained are excellent. Where, however, the two systems are in different hands the result is unsatisfactory. Thus, in America, where the financial interest of the telephone companies is involved, because of the desire to increase income by leasing lines for simultaneous telegraphy, and where, for this reason, these two operations are under the control of one technical staff, the result is excellent. The results are also fair in the European services, if the same technical officer supervises both telegraphy and telephony, and one service is co-ordinated with the other. The result is, on the contrary, very poor in all cases if the telegraph and the telephone services are in different hands.

This is evident if we consider how greatly the one system interferes with the other; that is, that careless handling of the one interferes at once with the proper functioning of the other, the two systems thus being brought into mutual opposition.

For this reason the service must be arranged in such a manner that the two systems cannot interfere with each other, and in as far as troubles are unavoidable, they must be reduced to a minimum. If they should exceed certain arrangements must be provided to hold out the less important service without delay.

In this direction the Hungarian telegraph and telephone service can show good results by comparison with similar installations, and, therefore, it will not be without interest to outline the principles which were followed in the formation of the system.

Above all, the simultaneous installation must be the simplest possible, because only thus and with the fewest possible instruments may undisturbed working be obtained. For this reason the method of simultaneous working, founded on the Wheatstone bridge principle, was made the basis of procedure.

The telephone circuit is closed through two inductive branches. At their point of intersection the battery branch is led off to the group of telegraph apparatus, while the telephone apparatus is placed in the so-called galvanometer branch.

It is thus evident that the connecting-in of the telephone apparatus—namely the leading of the telephone circuit through the switchboard—requires some care, because if there is a ground in the switchboard connections, the telegraph working is disturbed. Even if one telephone circuit is directly connected to another, and there be simultaneous working on the latter, the two telegraph simultaneous systems are brought into contact, which again causes marked disturbance. This may also be caused by the operators ringing simultaneously on several circuits from the same common source of ringing current.

Even if only one of the circuits fed from the common ringing source is connected for simultaneous telegraphy, such working will still be slow, because, in ringing on the simultaneous conductor, we ring also on five or six other conductors. However well insulated these circuits may be individually the insulation of the simultaneous telegraph circuit will be so far reduced by the connection that it will hardly be possible to maintain continuous telegraph working.

It is true that we can remove all these difficulties at one stroke, by connecting the incoming telephone circuit, before leading it to the switchboard, to a repeating coil working then only on the other half of the repeating coil. But by this plan the difficulty is only transferred to the other side—the telephone side. Above all, we have a loss of energy in the repeating coil to which are added losses inevitably occuring in the signaling apparatus, and it may happen that with such an arrangement the telephone subscriber does not get as much as 50 per cent. of the incoming speaking energy into his receiver. We must strive, therefore, that along with the undisturbed working of the telegraph, the telephone working be kept at the same relative level that would exist in the absence of simultaneous working. Moreover, the repeating coil not only weakens the speaking current but also the calling current, and we must, therefore, take precautions in this direction.

Under these conditions it is inadvisable to connect the circuit first to the repeating coil. As long as the circuit is on the calling apparatus there is no danger of disturbing the simultaneous working. The disturbance arises only at the moment of connecting. For this reason it would be sufficient to place the repeating coil in the connecting cord; but in the same path there is also the clearing-out signal, and a great loss of energy might thus be incurred. This we may, however, remedy if the repeating coil is constructed in such a manner as to serve at the same time as the clearing-out signal.

The clearing-out signal is, as a rule, connected in the bridge between the two branches of the circuit, and its duty is by its great self-induction to prevent the wasting of any considerable part of the speaking current. How far it is able to satisfy this

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demand might be readily ascertained by inserting a receiver in the shunt path. In spite of thus increasing the impedance of the bridge, we still obtain intelligible speaking even with a clearing-out signal of 2000 ohms resistance, if the latter is entirely embedded in iron. These currents do not so rigidly follow the rules which apply to strong currents and, therefore, inferences drawn from such rules do not apply in this case, as may be shown by a simple experiment. With such a clearing-out indicator 30 per cent. of the energy is lost on the average, and 70 per cent. only is available, as I have been able to ascertain myself.

With a well-constructed repeating coil, if arranged as a clearing-out signal, the loss is not greater. Consequently if we insert such a repeating coil into the connecting cord simultaneous working without affecting the telephone is secured.

The repeating coil transformed into a clearing-out drop naturally possesses a closed iron circuit. In European practice this plan is avoided and an open-circuit repeating coil is generally preferred. The question whether the repeating coil has an open or closed magnetic circuit does not affect the high frequency involved, and for weak currents this is of much less importane than the other losses that arise in an open-circuit repeating coil.

For relatively strong signaling currents the closed iron circuit is of decided advantage, because with open-circuit repeating coils it is not exceptionally possible to ring through with alternating current, while it is always certain when there is a closed iron circuit.

From the point of view of simultaneous working it only remains to separate the ringing currents.

This may be accomplished if alternations are used, by branching the ringing current at each operator's position on a separate repeating coil. Where batteries are used, which are to-day exceptional, each operator's position must be given its separate battery. This is a matter for the technical department.

As for the operating department it is only desirable that the telephone and telegraph operators should be able to communicate with each other quickly, so that they can co-operate in case of troubles.

In the simultaneous working apparatus itself, the branching coil is of the highest importance. It is most important that the inductance on the two sides should be equal. This is more important than the exact quality of their ohmic resistance. This, however, determines not only the resistance of the coil but also the size of copper wire to be used.

From the point of view of choking, it is desirable to use long coils; such coils, however, by reason of the phenomena of dispersion, prevent the complete neutralization of the telegraph currents, and, therefore, it is necessary to select short coils. With such an arrangement the operation of the telegraph apparatus is not perceptible on well-balanced telephone circuits.

In the Hungarian Telephone System the results hitherto obtained with simultaneous telegraphy and telephony, in the manner above described, have been excellent.

THEORY OF TELEPHONE-EXCHANGE DEVELOPMENT

Paper Presented at the International Electrical Congress at St. Louis

By G. De La Touanne.

THE question of telephone rates is one of widespread interest, but, although daily discussed, it is generally little understood by the public and sometimes even not by telephone managers. When looking at a large railway station and its extensive switching system, any one understands that every new track is a source of complication; but strange to say, as to the telephone, everything seems simple and cheap, because the subscriber's instrument is simple and easy to handle. It is just as if we considered the railroad industry easy, simple and cheap, because we have only to sit down in a car. The fault does not lie, perhaps, entirely with the public; the current opinion would possibly be less erroneous if the public were allowed more freely to learn what is behind the walls of a telephone office and what is the organization of the big telephone exchanges. Even the fact that to satisfy the call of one subscriber for any other of only 10,000 subscribers, involves provision for about 50,000,000 circuit combinations, does not make clear to the public the amount of capital, skill and inexhaustible care necessitated.

Thus, in spite of efforts to develop a better understanding of telephone affairs, it may not be useless to call to mind from time to time some of the conditions to which the telephone industry is subject. The following is an attempt to summarize the principal commercial questions met in starting a new telephone exchange. This attempt is necessarily academic, for I assume my city to be virgin ground, telephonically, and I leave competition out of account. These conditions are hardly to be found in practice, but it may not be without interest for others to compare with the theory here developed the data derived from experience, and I hope that some members of the section may be induced to make statistical contributions of actual results.

For illustration, let us consider a simple case, a single-office exchange to be started in a city of 50,000 inhabitants, one subscriber's instrument on each line. The income must cover expenses and provide a dividend. The outlay depends on the prospects of development. The first question is, therefore—What are these? It is exceedingly difficult to answer, even from what is known of old exchanges; the demand is quite different to-day from what it was in the early days. For want of precise data, we may reckon on 6 subscribers per 100 of population in, say 12 years, and perhaps 12 in 20 years; the 6 per cent. in 12 years seem very probable, and in 20 years the telephone will likely be more common than gas is to-day. Taking as the rate of increase of population in the city only the general rate of increase, 20 per cent. of the United States between the two censuses of 1890 and 1900, the present city of 50,000 inhabitants will have a population exceeding 60,000 in 12 years, and 72,000 in 20 years, that is, for the exchange 3,600 and nearly 8,500 subscribers, respectively. Therefore, we may plot the curve Fig. 1 of the mean yearly number n of subscribers supposed to be provided for.

The charges on the enterprise correspond first to the total capital invested; second, to the annual expense of working the exchange. Two portions are to be made of the total capital T, one, P, for permanent investment, another, F, as a portion of the floating capital necessary for the payment of the working expenses.

$$T = P + F.$$

Permanent Investment, P.

The part P is devoted to four classes of expenses, lines, land, building and apparatus (subscribers' instruments and central office apparatus), each presenting very distinct features.

Lines.

The line plant includes the wires and the distributing system of these wires.

As to the distribution of the circuits, there is no doubt that, the exchange being devised for several thousand subscribers, the

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distribution will be almost entirely underground; nowhere, probably, shall we again see a new Stockholm telephone tower, however remarkable a piece of work it may be. Both the interest of the public in the street and the interest of the enterprise will forbid frequent underground construction or reconstruction. We want, therefore, sewers with cable racks or some form of conduit, but both of ample capacity. The former system is probably the ideal one, but much too costly for an exchange of the size considered, unless the sewer system exists and is available for the purpose, as in Paris. We turn, therefore, to conduits; and as a properly built conduit lasts for years, there is no risk, and our policy will be to plan at once a system of conduits substantial and flexible, and devised for the full number of subscribers contemplated, 8,500.

But for spare plant, it would be sufficient to have 43 ducts, one per cable, for as many 200-pair cables, divided at the office into three or four routes, then, further away, into routes of 10, 8 ducts and less for 100 and 50-pair cables. But spare plant is one of the most difficult things to foresee. In the conduits you are bound to have spare ducts, first, because you cannot determine the ultimate number of lines in every direction; you can only approximate; second, because spare ducts facilitate repairs; third, because the addition of a few ducts at the start costs very little, but becomes

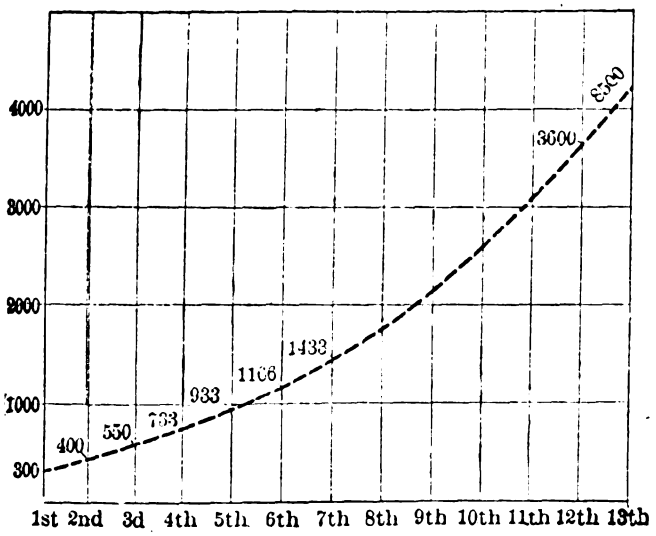

FIG. 1.—MEAN YEARLY NUMBER OF SUBSCRIBERS.

very expensive later on. The best practice allows an average of 40 per cent. spare ducts.

Outside the conduit system, the lines must be completed in different ways—inside house wiring, short sections of cable, pole lines, etc. An estimate of the probable average length l and of the probable average price p' per unit length (reserves included) will give the probable average lp' of this complement of the subscriber's line, while the principal part will be the cables drawn into the general system of conduits; the lines in the outlying districts are often disproportionately expensive; it is necessary to allow for this in estimating the average cost per subscriber.

As to lines in general ducts, the cost is that of the metallic circuit in the cable, laying and spares included. The lowest average preparation of spares is about 40 per cent.; this means that, in the calculations, the average length l' of underground circuit for a connected subscriber must be taken as 40 per cent. greater than it really is.

If there are rights of way to be paid for in any form—cash, free telephones, etc., this is a charge on capital, to the extent to which it involves immediate outlay; for a free telephone it will be the price of the user's instrument, line, jack, etc., and a proper proportion of land and building.

LAND, BUILDING, APPARATUS.

Apparatus comprises subscribers' instruments and central office equipment.

Calling the cost of a subscriber's set t, the total cost of the subscriber's instrument is nt.

Location and building must suit the type of switchboard adopted; storerooms, repair shops and offices can be leased almost anywhere; the switchboard with its accessories affords the only reason for buying land and erecting a building. The question of the switchboard must, therefore, be examined before the two others.

At the beginnings we shall use standard switchboards (cost b) for three reasons: First, they are cheap; second, untrained operators and inspectors cannot be charged with the handling of a multiple, with a complicated power plant and other accessories; third, up to, say, 600 answering jacks, there is little or no gain to the service in the multiple switchboard. But, of course, the land must be bought from quite other data and in view of the remote future, or what is considered a remote future in telephony, say 20 years; that is the space should provide a single floor for a multiple switchboard, to accommodate the ultimate number of subscribers, estimated at 8,500; if we put the average subscriber's connections per year ultimately at 3,000, or 10 per working-day, this will give 85,000 connections a day, which, with two-thirds of the traffic in five hours means a load of 11,333 connections per hour; at 200 per operator and per hour these 11,333 require 56.66 operators during the busy hours, let us say 57, able to reach the total number of jacks; this they will do with 19 sections, equipped with 450 answering jacks each; the 19 sections, with two end-sections, will have in a straight line (or in horseshoe shape) a length of about 129 feet. In dealing with the working capacity of the switchboard, we shall do better to abandon the old expression "subscribers per operator," and talk of "connections per operator's hour." "How many subscribers do the operators attend to?" is a question of idle curiosity, if not completed by another one as to the average number of connections per subscriber during the busy hours. "How many connections per operator and per hour, or more briefly, per operator hour, do you admit?" has a definite and practical meaning.

Coming back to the switchboard-room, we need a surface of about 3,700 sq. ft. to be doubled, if possible, for the cloakroom, the tearoom, etc. In round numbers the area of the land to buy will be 8,000 sq. ft. Such a purchase is almost free of risk, especially if not all built on, for the price L of the land is not likely to fall, and will probably rise: during the first years one floor will answer all the requirements of the service; if there is no existing building a light structure, one-story high, will suit all purposes, and the saving in building will partly make up for the price of the land, leaving the latter as good security for a loan, if necessary. The cost of this first construction, equipment included (protection against fire, heating apparatus, service telephones, furniture, lighting appliances, etc.), will be quite moderate. Some years later, when the enterprise is a success, a more substantial building (cost E) will be erected. Some may consider that the adoption of a single office is wrong, that it is better to have branch offices, and that, therefore, the above provisions for the head office are too costly.

The problem of sub-offices versus a single office is too important to be treated here, and we are leaving it out of consideration; we are studying simply the equipment of this single office. Taking the mean number of subscribers during the first year at 300, and for the second year at 400, we shall have four 100 line standards at once, another one the next year which will provide spare jacks for a time, and yet another one at the beginning of the third year. As the mean number of subscribers during this third year is assumed to be 550 (Fig. 1) we should have a margin of only about 100 at the beginning of the year, quite inadequate, unless, at the same time, we order a multiple switchboard to be furnished in about six months. As to this, to reduce the annoyance from frequent extensions in the switchroom when extensions are needed, we shall endeavor to make them for at least two years at a time. Even if it was not for the small size of the first multiple, we should, in consequence, order it for at least the mean number of subscribers in the fifth year, 933 from Fig. 1. In five years the traffic will be a known quantity, but to figure the probable cost B of the multiple switchboard, we must assume something; we can suppose that the average annual number of connections for these

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933 first subscribers has reached its ultimate figure, say 3,000, which corresponds to a traffic of 9,330 connections per working day, two-thirds of which concentrated on five hours at 1,244 per hour is not full work for seven operators.

This shows, first, that it will be amply sufficient to get three sections with one end-section, three operators' positions for the section, 150 answering jacks per position; second, that seven operators, or even six, during the busy hours will easily handle the work, facilities being afforded for calling in two or three extra operators either to relieve the others or for learning the service during the busy hours; third, that the multiple must be provided with electrically worked signals (self-restoring drops or lamps), thus permitting three operators only being used most of the day, without being worried to replace signals in position; fourth, that, if proper precautions are taken at the beginning, the mounting of the multiple will be easy.

Working Capital, F.

Working capital is a necessity, and it must be liberally provided for. For some time, and before the earning power of the exchange has become substantial, the only source from which it can be derived is the capital invested: a part F of the total capital T will constitute the working capital.

As a résumé we have $T = P + F$ where

$P=p+$	$nlp'+$	$nl'p''$	$+nt+$	$\left\{\begin{matrix}b\\B\end{matrix}\right.+$	L	$+\left\{\begin{matrix}e\\E\end{matrix}\right.$
Permanent investment. Conduit.	Complements of subscribers' lines.	Subscribers' circuits in general conduits.	Subscribers' instruments.	Switchboard.	Land.	Building.

Annual Expenses, A.

These include:

Working Expenses	W
Maintenance	M
Depreciation	D
Sinking Fund	S
Contingencies	C
Reserves and Dividends	R

Working Expenses, W.

Under this head may be grouped:

Taxes.
Fire and Accident Insurance.
Rights of Way and Royalties.
Management.
Operating Force.
Labor.

As to taxes and insurance there is little to be said. Rights of way and royalties paid under one name or another include a certain proportion of annual expenses; for instance, on the free telephone hypothesis, the user's service (maintenance of instruments, lines and switchboards, operators' pay, etc.) is a charge which must be taken into account.

As to expenses of management, or generally speaking as to staff, for a few subscribers the staff may be proportionally very small; but when the system grows and becomes more complicated, it is otherwise; you want numerous statistics, accurate records for every part of the business, strictly kept accounts of the various kinds of expenses and earnings, a high grade of maintenance of the plant, that is, you want a numerous and skilled staff, without which you will lose money, and dissatisfy the subscribers by an inefficient service. Telephony is purely an industry of the age. The product to be delivered, a quick service with good commercial transmission is to be delivered in large quantity; it is a wholesale industry; like a big manufacturing or commercial house it can make money; or, it may fail completely, if the whole machine is not kept in perfect order and if every detail is not constantly watched. From actual needs, the proportion in big exchanges has gradually risen to one employee to every twelve subscribers; the manager must bear this in mind to prevent any further necessity of raising the rates; when fixing rates at the start he is bound to consider the inevitable expenses of the future and not the low ones of the present.

Maintenance, M.

Maintenance includes materials and salaries.

The money provided for salaries is part of the above working expenses and is not considered here.

The cost of materials M can be divided into: Materials for general conduits; cost p_1.

Materials for completing the subscribers' lines outside of the conduits; cost npl'_1.

Materials for the portion of circuits in the conduits; cost $nl'p''_1$.

Materials for the subscribers' instruments; cost nt_1.

Materials for switchboard and accessories; cost $\left\{\begin{matrix}B\\b_1\end{matrix}\right.$

Maintenance $\left\{\begin{matrix}e\\E_1\end{matrix}\right.$ for the building will be added, but done as it is for the most part on contract, there will be no distinction between materials and labor.

The conduit being of substantial construction will not cost much; maintenance may be put at 3 per cent. of the initial cost. As a more delicate piece of apparatus and submitted to hard work, the switchboard will cost more for maintenance, probably between 5 and 10 per cent.

$$M = p_1 + nlp'_1 + nl'p''_1 + nt_1 + \left\{\begin{matrix}b\\B_1\end{matrix}\right. + 0 + \left\{\begin{matrix}e_1\\E_1\end{matrix}\right.$$

Depreciation, D.

Depreciation differs widely for the different parts of the system.

For the reason just given, the conduit depreciation will be small and 5 per cent. is probably more than enough, but as we have no sufficient data as to the life of the modern conduits, we may retain this percentage.

The same percentage, 5 per cent., seems reasonable for cables in conduits.

The aerial subscribers' lines, which are of less durable construction, we put at 20 per cent., and the subscribers' instruments, which are often roughly handled, at 33 per cent.

The first building may have to be replaced in eight or ten years; we shall take 12.50 per cent. depreciation. The second building, being assumed to be of first-class construction, 5 per cent. seems proper.

Switchboards of the standard type are assumed not to be used after the end of the third year, because of the growth of the exchange; there will be probably an opportunity to use them again in the future; but we shall not rely upon this and shall, therefore, count 33 per cent. depreciation on the price of the six standards, in spite of the very short service of the sixth.

For the multiple switchboard, we could, on the basis of the manufacture of to-day, count 10 years' use; but it is hard to say that any system can be considered as fulfilling all requirements more than six or eight years, owing to rapid changes in type; we think to-day that we are pretty nearly perfect; the same has been supposed in the past and has always proved erroneous by the remarkable improvements of the switchboard. Therefore, if our aim is to give the best service obtainable (and that is the only way to make the telephone popular), we are bound to consider changing our switchboards even when in good working order; from the commercial point of view alone there may be strong reasons for the prompt adoption of a new and more efficient system; putting the maximum certain life of the switchboard at eight years corresponds to a depreciation of 12.50 per cent. If later improvements do not necessitate changing the switchboard, it will be used two years more, thus saving so much for other purposes.

$$D = 0.05p + 0.20nlp' + 0.05nl'p'' + 0.33nt + \left\{\begin{matrix}0.33b\\0.125B\end{matrix}\right. + \left\{\begin{matrix}0.125e\\0.125E\end{matrix}\right.$$

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SINKING FUND AND INTEREST, S.

It will be perhaps difficult to avoid some borrowing; we shall assume that this is the case for a fraction mT of the total capital T and we have, therefore, to provide for a special sinking fund; we shall hasten, of course, the redemption of this debt as much as possible, in 10 years at the most; at 4 per cent. interest for 10 years, the annuity to be allowed is $0.1233mT$.

For the redemption of the capital $(1 - m)\ T$ we shall figure $0.05\ (1-m)\ T$ corresponding to redemption in 20 years.

$$S = 0.1233mT + 0.05(1 - m)T.$$

CONTINGENCIES, C.

Whatever expenses we may have provided for, there are always contingencies, gas explosions in manholes, flooding of the conduits, breaking down of fixtures or poles, accidents, etc. For such contingencies we shall add at least 10 per cent. to the above general expenses.

$$C = 0.10\ (M + D + W).$$

RESERVES AND DIVIDENDS, R.

The gross earnings must allow a certain sum to be put aside for further extensions or improvements. Considering the development of telephony, 10 per cent. of the total capital will not be too much to face the corresponding expenses.

Finally will come the dividends. Very little is to be expected in that respect for the first two or three years; later on a dividend of 7 per cent., when possible, will be only fair; but an increase of this dividend is not to be advocated even if the profits increase, until the reserves equal the capital, in one form or another.

As to annual charges, we allow 17 per cent. on the capital as a minimum to cover reserves and dividends, whenever circumstances permit, I mean when the rates calculated on that assumption remain within reasonable limits.

$$R = 0.17T \text{ (minimum)}.$$

INCOME.

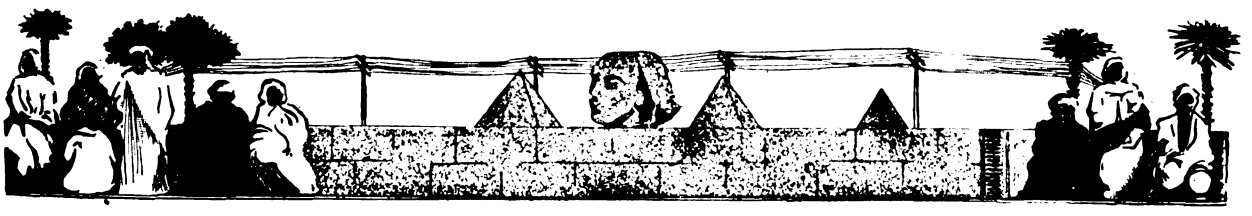
The revenue is derived entirely from the rates paid by the subscribers (flat rate or measured service). The average sum to be paid per subscriber (or per conversation) is the quotient of the division of the annual charges A into the number of subscribers n' (or number of conversations, i. e., number of subscribers $\times$ average number of conversations). The number of subscribers n' to be now considered is lower than the number n used in the calculation of the expenses. We are not sure to get the subscribers for whom we have provided; and as the expenses are for the largest part not proportional to the number of actual subscribers, it would be unsafe to fix the rates from the numbers n. For instance, the three great elements of cost are the underground plant, land and building; it is obvious that you cannot wait until you have 8500 subscribers to be repaid for your outlay. The ideal would be to adopt what the well-known economist, Mr. Cheysson, has called the "Tarif avantageux." If you sell any desirable product for nothing, you will sell much of it and get no return; if you sell at a prohibitive price, you could have a profit if there was any selling, but as there is none, the return is again naught. Between these two extremes the curve of total return (number of pieces sold $\times$ profit per piece) reaches a maximum and the corresponding price is the most advantageous, the one giving the maximum profit. This we could determine if it were possible to get from the public true answers to a circular stating the different rates which could be accorded by the exchange on different numbers of subscribers and asking them to state the highest rate at which they agree to subscribe. For a time the exchange would stand by this "advantageous tariff"; later on, when the financial situation is stronger (loan repaid or reserves laid by for plant renewals), the rates will be reduced and a new "advantageous tariff" applied, benefiting both the enterprise and the public; if the subscribers knew that with a certain growth their own rates would be reduced, they would become soliciting agents. But this is impracticable, and the manager must base his rates on other considerations. He might plot the probable charges for a certain number of years and not only for the two or three first ones, and thus get a better idea of a scheme of rates to apply progressively and methodically, but only a knowledge of the local conditions will allow him to start on a proper basis.

Two general remarks may be added.

As has been noted above, conduit construction and land purchase are two heavy burdens on the enterprise. Therefore, if for some reason the cost of conduit is practically eliminated or considerably reduced, as by the use of a system of sewers or by the payment of a small rent for municipal or private subways, the telephone enterprise will be able to reduce rates very appreciably. Similarly a reduction will be possible if the concession is a long one and if only a small sinking fund rate is applied to the land, being justified by the nature of the property.

The next most important feature is the discipline, care and close co-operation of the whole staff. Since in many cases maintenance is a third or more of the gross earnings, it is needless to say that not only must the best construction be done at the start, but also that the greatest care is called for in the use of the plant and in its up-keep. As to the operating force, the necessity of discipline is still more striking. Discipline can increase the efficiency of this force as one to three or four. In this connection some may think 200 connections per operator hour too high, but in reality this should be taken as a minimum; it is a mere question of training. I remember in the Paris system of the old times with an average of two trunkings for each connection, a certain operator who could usually make 120 connections per hour; her work represented something like 400 connections an hour with a modern switchboard in a single office exchange. And about 1890, the operators at Nashville, Tenn., series multiple switchboard, with testing as distinct from connecting plugs, actually made 300 connections per hour and thought they could make 30 in five minutes (rate: 360 per hour) on a spurt. These same operators could doubtless handle 400 connections per hour with the improved switchboards of to-day (say one-fourth to one-third less, if the connections are trunked). This was due to discipline. The operators knew what they had to do and not to do, never talked with a subscriber, but connected him with the chief operator as soon as he began to say anything besides the number of the subscriber wanted, and so on. The force was well disciplined, so were the subscribers. The result was an efficient co-operation of both, giving the public the kind of service paid for.

If for any reason the management is afraid to give the operators more than say 1500 connections a day to handle, this has nothing to do with the operating capacity of the switchboard nor with the number of connections per operator hour; that means simply a special distribution of the force through the day, three gangs of operators, for instance, instead of two. The operator when at work must get all that can be got out of the switchboard, then go home; that is the place for rest, not the exchange. Let her work hard six hours or even five, and go; she will enjoy her rest and work more cheerfully. Hard work, good rest, is a sound rule everywhere.



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THE WEEK'S MESSAGES

FINANCIAL.

BIRMINGHAM, ALA.—At a recent meeting of the stockholders of the People's Telephone Company, it was determined to cancel the present authorized issue of $100,000 bonds and to substitute therefor a new issue of $200,000 five per cent. twenty-year gold bonds. The new issue will be a first mortgage and will be secured by a trust deed on all of the company's property and franchises. The proceeds of the sale of the bonds will be devoted to settling outstanding indebtedness and to take care of the future growth.

CHICAGO, ILL.—The Interstate Telephone & Telegraph Company has given a trust deed to the American Trust & Savings Bank for the purpose of acquiring and enlarging the property of the Northwestern Telephone Company and retiring the bonds outstanding. Provision is made for the issue of $50,000,000 5 per cent. bonds.

WAVERLY, ILL.—The Waverly Telephone Company has increased its capital stock from $35,000 to $50,000.

CENTERMORELAND, IND.—The Centermoreland Telephone Company has increased its capital stock to $50,000.

EDINBURG, IND.—The Citizens' Telephone Company, of Edinburg, has increased its capital stock from $3,000 to $9,000. J. A. Thompson is president of the company.

SOUTH WHITELY, IND.—The Laimerr Mutual Telephone Company at a recent meeting decided to increase the capital stock from $25,000 to $100,000.

PHILADELPHIA, PA.—The report of the Keystone Telephone Company for the year ending Dec. 31st, 1903, shows total income of $482,832 and after paying operating expenses, etc., a net sum of $249,073.

AUSTIN, TEX.—The Citizens' Telephone Company has increased its capital stock from $4,000 to $8,000.

SANTA ANA, CAL.—G. A. Edgar, representing the United States Long Distance Telephone and Telegraph Company, was awarded the franchise for a telephone system here.

FRANCHISES.

ATHENS, GA.—The Georgia Telephone Supply Company, of Atlanta, has asked for a charter to install a local and long distance telephone system in this city. The company already has franchise granted for exchanges at Union Point and Madison.

CORDELE, GA.—The Farmers' and Business Men's Telephone Co. has been granted a franchise to do business here. J. C. Ledbetter is at the head of the company.

QUINCY, ILL.—The ordinance granting a franchise to the Quincy Automatic Telephone Company has passed second reading.

CITY OF MEXICO, MEXICO.—Jose Sitzenstatter, of the City of Mexico, has obtained from the Mexican government a concession for the installation of a new Independent telephone system in this city.

ARGENTINE, MO.—The Home Telephone Company has asked the city council for a franchise.

FREMONT, NEB.—The Fremont Telephone Company has been granted a franchise in this town.

MINDEN, NEB.—The Kearney Construction Company has been granted a franchise for an independent telephone system at Minden. T. F. Parmele, of Plattsmouth, is president, and W. J. Stadelman, of Kearney, vice-president. A first-class exchange will be installed in the near future.

GENEVA, OHIO.—A franchise has been asked by H. Hood, of Toledo, to operate a telephone system in this city.

COUDERSPORT, PA.—The Allegheny Valley Telephone Company has been granted a franchise. It will also ask for a franchise in Austin and Galeton. It is expected that the toll system will be in operation in the very near future.

ELECTIONS.

MONTICELLO, N. Y.—The Monticello Telephone Company has elected officers as follows: President, C. L. McLoughlin; secretary, G. L. Hatch; treasurer, H. F. Holmes.

NEW COMPANY NOTES.

ENTERPRISE, ALA.—The Enterprise Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are: J. E. Henderson, Walden Thompson, T. D. L. Edwards, Nick Thompson. Local and long distance telephones are to be operated.

TALUCAH, ALA.—The Inter-County Telephone Co. has been chartered here by E. C. and C. B. Hageboom.

EUSTIS, FLA.—A new telephone company has been incorporated with a capital stock of $2,500 by the following incorporators: H. G. Whitsett, H. W. Bishop, Charles H. Newell, W. B. Merck and F. A. Hall.

FINDLAY, ILL.—The East Okaw Telephone Company has been incorporated with a capital stock of $600 by James E. Francisco, Archibald W. Lesley and Curtis Spicer.

FINDLAY, ILL.—The Mutual Telephone Company No. 3, of Findlay, has been organized. D. B. Yantis is president and G. H. Clay secretary. The line will be erected and telephones installed at once.

UNIONVILLE, IND.—The Unionville Telephone Company has been incorporated with a capital stock of $399. The directors are: George W. Welch, Milford Young, P. F. Lincicome, N. W. Lincicome and J. W. Slater.

LARRABEE, IA.—The Spring Cedar Mutual Telephone Company has been incorporated with a capital stock of $5,000 by Richard Gilbert and others.

VIELE IA.—The Viele Telephone Company has been incorporated with a capital stock of $3,000 by R. C. Conlee and others.

HILLSBORO, KY.—The Hillsboro and Flemingsburg Telephone Co. has been incorporated to do business here.

SCOTTSVILLE, KY.—The Scottsville and Barren River Telephone Co. has been incorporated by W. B. Ray, R. F. Hood and J. T. Hunt.

RED HOUSE, MD.—The Red House Telephone Company has been organized by H. Lisler and P. F. Snyder.

LITCHFIELD, MICH.—The Banker Telephone Company, of Litchfield, has filed articles of incorporation with the Secretary of State with a capital stock of $10,000.

STERLING, MICH.—The Aranno Telephone Company has been incorporated with a capital stock of $6,000.

MORRILL, MINN.—The Morrill Rural Telephone Company has filed articles of incorporation with a capital stock of $50,000. The directors are: Henry Foss, Fred Cassidy, Aaron Montz, Guy Cowill, John Thoen, C. S. Weigel and C. W. Bouck.

STILLWATER, MINN.—The Twin Lake Telephone Company has been organized and will build a line to connect with the city service. O. B. Masterson is president.

BOONEVILLE, MISS.—The Booneville Telephone Co., capitalized at $10,000, has been chartered, with Harvey Mayers, B. G. Henning and others as incorporators.

PURVIS, MISS.—The Purvis Light and Power Company has been organized here, with the following officers: W. H. Magee, president; J. W. Woodward, vice-president and general manager; C. V. Hathorne, secretary and treasurer. The purpose of the corporation is to operate an electric plant, local telephone system, water works and manufacture ice. Machinery has been ordered for the electric light plant.

LAMONTE, MO.—The Lamonte Telephone Company has been organized here with a capital stock of $6,600. The following officers were elected: W. E. Piles, president; F. Wimer, vice-president; J. A. Fleming, secretary, and John McCurdy, treasurer.

SPRING CREEK, MO.—The Spring Creek Telephone Company has been incorporated with a capital stock of $500.

WAYNE, NEB.—The Wayne Independent Telephone Company has been incorporated with a capital stock of $15,000.

JERSEY CITY, N. J.—The Dixon Home Telephone Company has bees incorporated with a capital stock of $125,000. The incorporators are: Charles N. King, W. Monds Green, Elmer H. Geran, all of Jersey City.

NORTH CREEK, N. Y.—The North Creek Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are: C. A. Pereau, W. T. Campbell and J. L. Fuller.

ROMULUS, N. Y.—The McDougal Telephone Company has been organized here with the following officers: Addison Baldridge, president; R. C. Allen, vice-president; Clarence C. Updike, secretary, and Alexander Daldridge, treasurer. Work is to be begun at once and it is expected the new line will be in operation before winter.

VALOIS, N. Y.—The Caywood, Lodi and Valois Telephone Company has been incorporated with a capital stock of $5,000. Incorporators are: W. Traphagen, of Caywood, Charles Marsh and Bert Van Vleet, of Valois.

NORTHWOOD, N. D.—The Red River Valley Telephone Company was destroyed by fire with a loss of about $300.

CLARIDON TOWNSHIP, OHIO.—The Beach Telephone Co. has been incorporated by W. O. Miller, Levi Harruff, Joseph Klinefelter, E. F. Tittlebaugh and Philip Ruehrmund; capital, $10,000.

MARION, OHIO.—The Besch Telephone Company has been incorporated with a capital stock of $10,000 by the following incorporators: W. O. Miller, Joseph Klanefeller, E. F. Tittlebaugh, Levi Harruff and Philip Ruehrmund.

NORMAN, OKLA.—The Farmers' Central Telephone Co. has been chartered with a capital stock of $5,000. The incorporators are: G. E. Fuller and J. W. Abscher, of Franklin, and J. P. M. Ham, of Norman.

HERNDON, PA.—The Mahoney and Mahantongo Telephone Company has been organized here.

BATESBURG, S. C.—The Batesburg Telephone Co. has been chartered by William Westmoreland, J. T. Kneece and W. P. Timmerman.

ST. STEPHENS, S. C.—W. A. Floyd, W. P. Russell, R. Rittenberg and W. A. Bunch have incorporated the Kerkeley Telephone Co. They have forty miles of line in operation and contemplate various extensions to the system.

NASHVILLE, TENN.—The Tri-State Telephone Company, of Shelby County, has been incorporated with a capital stock of $10,000 by Charles D. M. Greer, J. T. Warren, F. N. Fisher, L. T. Cavanaugh and A. Outzen.

HUBBARD, TEX.—The Hubbard City Telephone Company has been incorporated with a capital stock of $5,000 by C. W. Hobson, A. L. Collins and Hyde Macfarlane.

NACOGDOCHES, TEX.—The Nacogdoches Southeastern Telephone Co. has been chartered. Purpose, the construction and operation of telephone lines in Nacogdoches County. Incorporators: Charles Hoya, June C. Harris, Allan Seale, Robert Lindsay and George H. Nusenheimer.

RELIANCE, TEX.—A telephone company has been organized at this place to build a line from Reliance to Bryan. The line will be four miles long. The promoters are: Howell Brothers, O. Saunders, Mr. Morgan and Walter Edge.

RELIEF, VA.—The Frederick & Shenandoah Telephone Company has been incorporated with a capital stock of $1,000. The officers of the new company are: President, I. Funkhouser; vice-president, I. A. Graves; secretary, E. R. McDonald; treasurer, H. A. Richards.

UNDERGROUND.

LITTLE ROCK, ARK.—A meeting of the electric street and ordinance committees will be held to take up the ordinance regarding underground telephone wires. The ordinance has already been drafted and will be submitted to the city council.

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RIVERSIDE, CAL.—The Home Telephone Company has been granted permission to lay underground conduits in the business section of the city.

COMBINATIONS.

JACKSONVILLE, FLA.—The Jacksonville Telephone Company has been sold to D. L. Gerow.

ST. JOHNS, N. B.—The Union Telephone Co. and the Central Telephone Co., operating in New Brunswick, intend to amalgamate. The Union Co. has its headquarters at Florenceville, and uses the Stranger automatic central. The Central Co. operates from Bellisle.

TORONTO, ONTARIO, CANADA.—The Toronto Municipal Association passed a resolution favoring the purchase by the government of the trunk telephone lines.

MISCELLANEOUS.

NORTH BIRMINGHAM, ALA.—The People's Home Telephone Company's exchange was destroyed by fire recently. Loss about $1,500, partly covered by insurance.

LONDON, ENG.—A number of towns on the northern coast of France are now connected with London by telephone, the charge being $2 for three minutes' talk.

CHICAGO, ILL.—The Illinois Tunnel Company has now in service over 8,000 trunk line telephones, and is rapidly extending its service in every direction. President Wheeler predicts that within another year the company will have about 25,000 telephones in service.

LEXINGTON, KY.—The East Tennessee Telephone Company has been sued by the city of Lexington through the firm of Hunt & Hunt for $949.89 back taxes, not including penalty and interest alleged to be due upon its franchise. The petition recites that the franchise was assessed at $15,217 for 1899 and $15,000 for the years 1900 to 1903 inclusive, and states that the defendant company failed to pay taxes for those years.

PORTLAND, ME.—The Moosehead Telephone Company has applied for permission to build its line along the route of the Canadian Pacific Railway.

NORWOOD, MINN.—The Norwood Young America Telephone Company's exchange at Wauconia was almost totally destroyed by the cyclone which passed through this section recently.

HASTINGS, NEB.—The Independent Telephone Company is making preparations for erecting a new exchange building to cost $10,000.

OMAHA, NEB.—The Mutual Telephone Companies operating in Garfield County have formed an association with headquarters at Burwell.

YORK, NEB.—The Independent Telephone Company is issuing a new directory for York County, which shows 1,400 subscribers. This is one of the largest independent companies in the State and has one of the best equipped telephone exchanges and gives entire satisfaction. Nearly every farmer now has a telephone, and with the rural mail service, farm life in York County is not as monotonous as a farmer's life years ago.

ERIEVILLE, N. Y.—The Erieville branch of the Newton Telephone system is ready for business.

OSWEGO, N. Y.—The Ontario Telephone Company will shortly issue a new directory which, besides being the most complete ever issued, will also show the great strides this company has made during the last six months.

HOBOKEN, N. J.—The Erie Railroad Company has applied to a number of telephone equipment houses in Cleveland and the east for estimates on the cost of installing a system between Cleveland and New York. The telegraph system of the road has, particularly of late, been greatly overtaxed, and it is the intention of the company eventually to extend the telephone system to Chicago, the approximate entire length being 639 miles. It is estimated that the cost will be in excess of $100,000.

BRANTFORD, ONTARIO.—Recently the special committee of the council of the telephone service resolved by a vote of four to two to commence the construction of a civic telephone system at an estimated cost of $37,000. This matter has been under consideration for several months and the committee visited Port Arthur and Fort William in connection with the proposal.

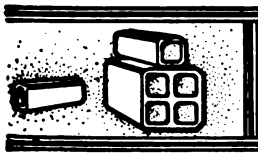
POTTSVILLE, PA.—The Mahoning & Mahantongo Telephone Company, a concern that will do business throughout the farming regions of Northumberland, Dauphin and Snyder Counties, will be organized in the near future.

BROWNSVILLE, TEX.—The city will establish a telephone system. Address the mayor for information.

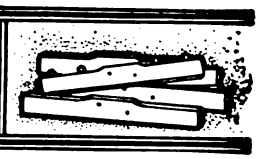
EL PASO, TEX.—The receiver has been discharged in the bankruptcy case of Mrs. Anna M. Brett, who has for several years been promoting the establishment of an independent telephone system in El Paso, and it is announced that that system will now be completed as fast as possible.

EL PASO, TEX.—The city council has under consideration an application made by R. A. Wooldridge and C. F. Wren for a franchise to establish a new telephone system in El Paso, at a cost of not less than $100,000.

KENOSHA, WIS.—The forthcoming directory of the Citizens' Telephone & Telegraph Company will embrace a list of subscribers to the Independent telephone companies of about twenty-five surrounding towns. The Independent telephone system of the neighborhood is exceedingly prosperous and growing rapidly.



New Construction in the Field



TORONTO, CANADA.—The Columbiana County Telephone Company is anticipating re-establishing an Independent telephone exchange here connecting with the Phoenix and United States lines.

LATON, CAL.—A new farmer's telephone line is being established east of Laton.

SAN DIEGO, CAL.—The Home Telephone Company is rapidly completing its line plant and exchange building.

LANARK, ILL.—The Lee County Telephone Company will rebuild its system and will place the wires underground. It is estimated that the change will cost about $75,000.

MARSHALL, ILL.—The Westfield Telephone Company will install 500 feet of aerial cable in the business part of the town.

PEORIA, ILL.—The Citizens' Telephone Company will install a line from this place to Roanoke and into East Peoria.

SOUTH McALESTER, I. T.—The South McAlester-Eufaula Telephone Company has installed a new switchboard.

OSGOOD, IND.—A telephone line is being built from here to Dewberry.

SOUTH WHITLEY, IND.—The Farmers' Mutual Telephone Company will install a new system here.

CHESTER, IA.—The Chester Standard Telephone Company, of Waukon and Dubuque, is installing a complete up-to-date long distance telephone exchange system in this place.

WEBSTER CITY, IA.—The Martin Telephone Company is installing another section on its switchboard. The new section will contain 400 drops.

ASHLAND, KAN.—A movement is on foot to put in a telephone line from Ashland to Lexington and probably on to Bucklin.

LEWISTON, ME.—The White Mountain Telephone Company is making large extensions to its system.

PENTWATER, MICH.—An automatic exchange is being installed in this town.

STILLWATER, MINN.—The Northwestern Telephone Company is putting in about 10,000 extra feet of cable.

MOOREHEAD, MINN.—The Red River Telephone Company is extending its lines into Clay and Cuss Counties from this town.

WELDON, N. C.—The Home Telephone Co. will make improvements and extensions to its system here. F. C. Toeplemann is general manager.

GENEVA, N. Y.—The Geneva Telephone Company is extending its lines into the county districts.

NEWBURGH, N. Y.—The State Line Telephone Company is constructing lines into Dutchess County and will connect with Wetchester County and the Colonial Telephone Company at Newburgh.

OWEGA, N. Y.—A telephone line connecting Newark Valley with Foster is nearly completed. The line will run to Union Center to connect with the York state line.

PINE PLAINS, N. Y.—The State Line Telephone Company has completed its lines to connnect with the Sharon Company. The company is also building a line to connect Shekomeko and also a line from Poughkeepsie and Arlington.

AKRON, OHIO—The People's Telephone Company will construct lines into the country district surrounding Barberton.

CLEVELAND, OHIO.—The United States Telephone Company has started the construction of new toll lines at Columbus and Medina. A line will also shortly be started between Ravenna and Alliance.

KENTON, OHIO.—The Kenton Telephone Company will install a new two position toll board. New copper toll circuits are being strung between Kenton and Columbus and Kenton and Bowling Green.

PORTSMOUTH, OHIO.—The Home Telephone Company is rapidly pushing its line, which passes between Portsmouth via Mabee, to completion.

WEST UNION, OHIO.—The Independent Telephone Company, doing business in Scioto, Pike, Adams, Jackson and Ross Counties, has bought a telegraph line of the Western Union Telegraph Company and will install a system of telephones in these counties. A line to connect with the Clinton, Highland and Clermont County system will be built.

MEADVILLE, PA.—The Meadville Telephone Company will build a line between Meadville and Cochranton. When this line is completed it will give the Meadville company a through copper circuit to Pittsburg and also direct connection with Franklin, Oil City and Titusville. John H. Wright is general manager of the company. The company has over 1200 telephones in use in Meadville.

MUNCY, PA.—A telephone line will be built from this town to Unityville.

RICHMOND, PA.—A new telephone line is to be established between Conneaut and Richmond. The line will soon be in working order.

COLUMBIA, TENN.—The Citizens' Telephone Co. has let the contract for the building of a new line from this city up the Bear Creek pike to Losea and points beyond. It is also projected to be extended to Hardison's Mill and Rally Hill.

LEXINGTON, VA.—The Lexington Mutual Telephone Co. will improve and enlarge its exchange here at a cost of $5,000.

SUFFOLK, VA.—The Nansemond Telephone Company, of Suffolk, is putting in new telephones. Long distance communication can be had with the surrounding country and this territory is being rapidly extended.

BETHESDA, W. VA.—The Belmont Telephone Company will build a system in this town.

TRADE NOTES.

THE STERLING ELECTRIC COMPANY, Lafayette, Ind., has just completed a large export order for London, England. This company reports a steady growth in export business.

THE S. H. COUCH COMPANY, 156 Pearl street, Boston, Mass., is manufacturing a fine line of magneto telephones and apparatus, and all exchange managers looking for the right article at the right price should communicate with the firm and secure a copy of its catalogue.

FRANK B. COOK, of Chicago, has recently sold an addition to the distributing frame of the Auburn Telephone Company, of Auburn, N. Y., which was manufactured for him. The frame is Cook's type L, equipped with a No. 44 protector. The addition of 400 lines brings the total capacity up to 2,050.

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THE NATIONAL TOLL TICKET Co., Albion, Mich., has recently issued catalogue No. 2, which describes the tickets this company manufactures. There are samples of 12 varieties of toll tickets beside trouble tickets. This firm will also be pleased to furnish estimates for printing special forms and subscribers' lists.

A. GROTHWELL, of 136 Liberty street, New York, and 26 Montgomery street, San Francisco, has issued a booklet describing "Mogul" preservative paints, compounds and varnishes. The preservative paint is specially prepared to prevent dry rot of poles at the butt, bolt holes, gains or any other point that is liable to be affected. It is a quick dryer, water-proof, ice, frost and snow-proof, and affords ample protection for cables and battery cells in damp places. "Mogul" armature varnish is especially good for fine work in insulating cable boxes and other places requiring insulation.

THE MONARCH TELEPHONE MFG. Co., of Chicago, has issued an attractive booklet entitled "The Secret of Our Success." It contains a number of testimonial letters received from users of Monarch apparatus and also gives illustrations and descriptions of new features found in the telephones manufactured by this company. The title page indicates that the success of the Monarch Company is due to an honest endeavor to make perfect telephone apparatus, to always have its equipment up to date and to treat its customers in a fair and square manner. Such a policy as this should bring success to any one.

THE BAIRD MANUFACTURING Co. (maker of Baird Pay-Stations), has just brought out a new Permanent Adjustment Invisible Joint Telephone Transmitter Arm which is finding great favor wherever it is shown. That there is genuine merit in this arm is proven by the fact that after being attached to a machine and given 1,000,000 motions, the friction of the arm is not injured in the slightest, but it will hold a transmitter exactly where it is put. These arms are beautifully finished and telephone companies may secure them by specifying Baird Transmitter Arms in their orders for telephones of their usual manufacturer.

THE MEASURED SERVICE Co., 153-159 So. Jefferson street, Chicago, is putting on the market a measured service meter of entirely a new type. Each subscriber registers his call and at the end of each month instead of sending around a collector the subscriber is called up and asked to "turn the lever forward." In doing so a statement of the number of calls on the meter is sent over the wire and recorded on a tape, by the Morse code, at the central office. The system has the advantage of allowing the subscriber to know how many calls he is making and does away with the detail of keeping track of the calls at the exchange and yet at the same time everything is completely under the control of the central office. The company will be glad to give interested parties any further information.

THE AMERICAN ELECTRIC TELEPHONE Co., of Chicago, have just received an order for the building of a combination long distance and rural line switchboard to be installed at Hopkinsville, Ky., by the Ideal Construction Company, of Lima, Ohio. This order is regarded as an important one from an engineering standpoint owing to the special requirements which it is necessary to meet, for this switchboard must be provided with means for trunking to and from both the Strowger Automatic Exchange and the Globe Automatic Exchange. At the same time, service must be given on the American Company's system of selective party lines. Thus, it will be observed that the trunking and cord circuit arrangement must be such as to permit of interconnection between magneto bridging lines, party line selective, Globe Automatic and Strowger Automatic lines.

THE CENTURY TELEPHONE CONSTRUCTION Co., of Buffalo, N. Y., has recently increased its capital stock from $100,000 to $500,000. This increase was made necessary on account of the rapid growth and development of the company's business within the last few months. The entire increase of capital stock will be fully paid up. This company manufactures an improved style of apparatus which, from the number of voluntary testimonials, is filling a long-felt want. The sales of the Century switchboards, telephones, and various other pieces of apparatus are increasing in an unprecedented mannner. The directors of the company will be: A. D. Bissell, president People's Bank, Buffalo, N. Y., and vice-president of the National Banking Association; Theodore S. Fassett, of the Smith-Fassett Co., lumber dealers, Tonawanda, N. Y.; Martin Carey, of Bissell, Carey and Cook, attorneys, Buffalo, N. Y.; and B. G. Hubbell, president of the Consolidated Telephone Company, Buffalo, N. Y. The men associated with the company are among the best financiers in this part of the country, and are enthusiastic over its organization. In fact, there are few telephone companies that have so prominent a personnel in its list of stockholders as is embraced in that of the Century Telephone Construction Company.

THE AMERICAN CONDUIT COMPANY, of Chicago, Ill., has an attractive and interesting exhibit in the court of the Palace of Electricity at the World's Fair. This exhibit is worthy of the attention of anyone interested in underground electrical construction. The exhibit demonstrates the high class of underground construction obtained by the use of their bituminized fiber conduit. It consists of a portion of a manhole showing the neatness of construction possible with this conduit at the entrance of the manhole. Also a portion of the underground system with the street, the earth and the concrete filling removed to expose the ducts themselves. This portion brings out one of the advantages of the long lengths, namely, the few joints in the system, and also shows the perfect and permanent alignment secured and the sealed joints, a feature invented and introduced by this company.

Another portion of the exhibit shows the open trench with the various layers of ducts as they appear in the course of actual progress of the construction work.

There are in addition to the above some bends of various radii and diameter and some lengths of conduit. Also some interesting photographs showing construction work in various cities where bituminized fiber conduit has been used. An attractively furnished office or reception room is provided for the convenience and comfort of those who are directly or indirectly interested in electrical conduits, and visitors will secure the courteous attention of C. M. Ripley, electrical engineer, in charge of the exhibit, who seems always delighted to give information relative to bituminized fiber conduit.

The company hopes to give some interesting demonstrations in the way of tests showing the high insulating qualities of this conduit.

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

WANTED TO SELL.—A telephone system operating in eight counties in a western State, with five small exchanges. Good city connections and a first-class investment. Easy terms to the right party. Address, Box 239, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 239

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED to correspond with investor for the advancement of Independent telephone interests in Eastern Iowa. Good territory; small capital. Address Box 250, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 250

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

WANTED—Good mechanical draughtsman; must be perfectly familiar with telephone work. Address Box 243, AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 243

POSITION wanted as manager or assistant of exchange, 400 to 1,000 subscribers, within 150 miles of New York. Experience with Bell and Independent companies in all lines, construction, repair and maintenance, switchboard, lines and instruments. Address Box 249, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 249

WANTED—Position as manager or superintendent of telephone company; East preferred. Eight years' experience as superintendent of largest plants. Best of references. Address Box 248, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 248

WANTED—Bright young man of good appearance, who understands thoroughly technical telephony. One who has worked in the field preferred. Must be able to write descriptive booklets on telephone apparatus. Exceptional prospects for the right man. Address Box 242, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 242

POSITION WANTED—As manager or superintendent of telephone company; have had seven years' practical experience in all branches of the business. Address Box 247, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 247

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EVERY FEW DAYS

one of our old customers Telegraphs us his Pole order.

That's one evidence of our Promptness in filling orders, isn't it?

What Sizes shall we quote you on?

MALTBY CEDAR COMPANY, 512 Phoenix Block, Bay City, Mich.

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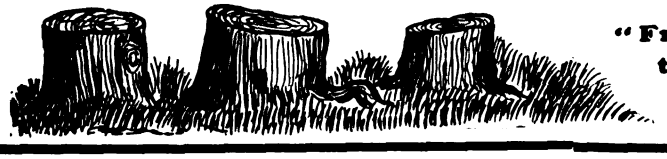
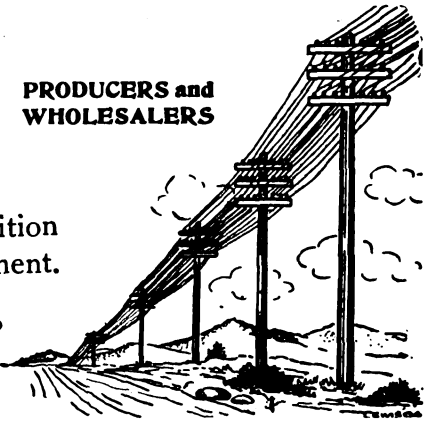
PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



Cedar Telephone Poles

Thoroughly Seasoned,
Any Length or Size,
Immediate Shipment,
Seven Distributing Yards,
Forty Years Experience.

Main Office:
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Wm. Mueller Company

WHITE CEDAR POLES

Quick shipment and high-grade stock. Doesn't that entitle us to your order?

Page & Hill Co., *1003 LUMBER EXCHANGE, MINNEAPOLIS, MINN.*

BUY YOUR POLES

When you want satisfaction without worry and trouble

OF

The Fowler Companies

Fowler-Jacobs Co. Elmore-Fowler-Jacobs Co. John H. Fowler & Co.

FISHER BUILDING, CHICAGO, ILL.

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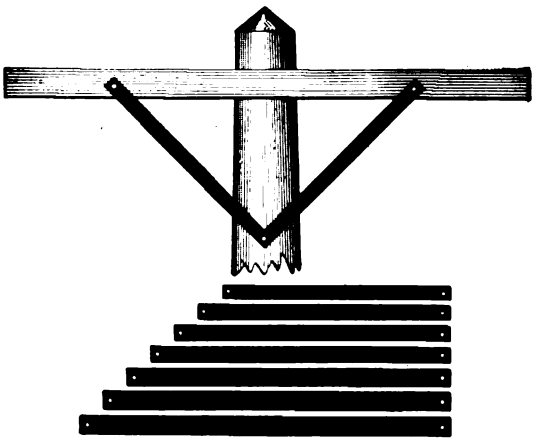

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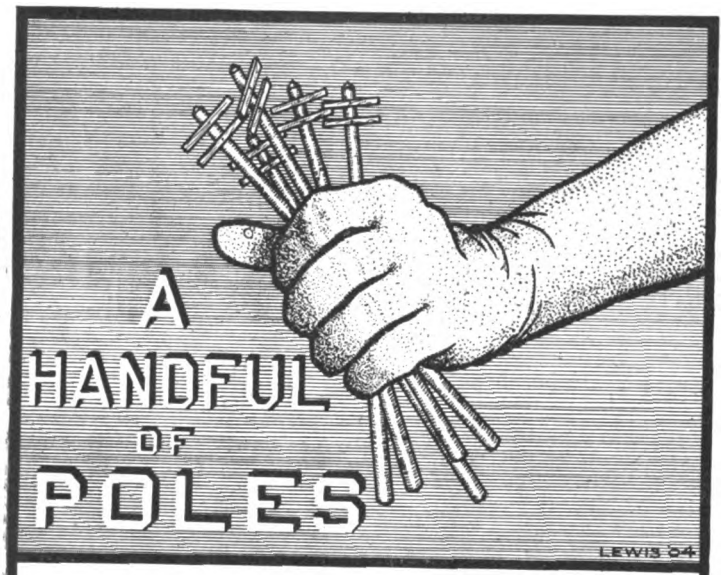
THE STEEL MADE AND ALL THE WORK DONE AT OUR OWN PLANT.

All Sizes — Quick Shipment

Plain and Galvanized

INLAND STEEL COMPANY

FIRST NAT'L BANK BLDG. CHICAGO



That's about what most dealers keep in stock. We have them by the carload—vast quantities at your service. So we can ship promptly and quote low prices. The Best Poles, too.

SAND POINT CEDAR COMPANY

SAND POINT, IDAHO

CEDAR POLES

In All Sizes For All Purposes. Large Stocks. Prompt Shipments. Distributing yards at advantageous shipping points.

The Valentine-Clark Co.

(INCORPORATED 1892)

Main Offices

234 La Salle Street, CHICAGO.

Also Central Western Agents for the

TRIPARTITE STEEL POLE

Manufactured by

Franklin Rolling Mill & Foundry Co.

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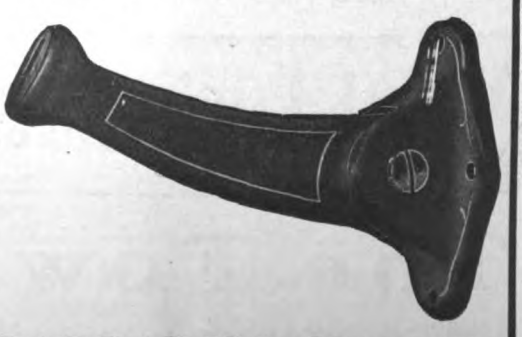
WE HELP TO MAKE

A Good Telephone



ADDRESS "BARRARM," CLEVELAND

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DOUBLEDAY-HILL ELECTRIC CO.

MANUFACTURERS AND DEALERS

TELEPHONE MATERIAL

Pittsburg, :: Pennsylvania

Wire, Cross Arms, Pins — Brackets, Insulators, Connectors — Lightning Arresters, Fuses, Telephones, Braces, Bolts, etc.

Highest Grade — Lowest Prices — Quickest Delivery

OWING to the limited number of copies carried on file and the large demands, back numbers of THE AMERICAN TELEPHONE JOURNAL will hereafter be sold for twenty-five cents per copy.

THE AMERICAN TELEPHONE JOURNAL,

116 NASSAU ST. CITY OF NEW YORK

NEW TRUNKS

ARE NOT AS GOOD AS

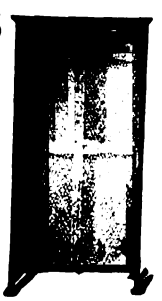
EXPANDED

Metal Lockers

FOR YOUR OPERATORS.

A Safe and Sanitary place to leave wraps. Increases the efficiency of your Exchange. In use in hundreds of offices. Also

SHEET STEEL AND OPEN MESH MATERIAL CLOSETS



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CONTINUED ON PAGE 47.

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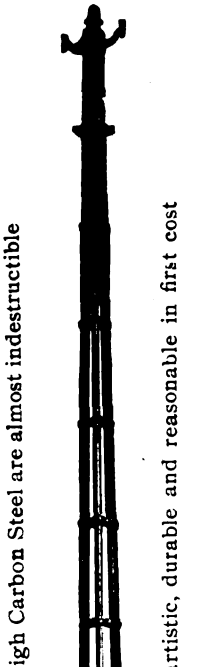
The Open-Wireless Telephone Plant

is an all-cable plant; that is it has no open wire (bare wire) or cross arms, and when supported on steel poles

DEPRECIATION IS ALMOST ELIMINATED; MAINTENANCE REDUCED TO A MINIMUM



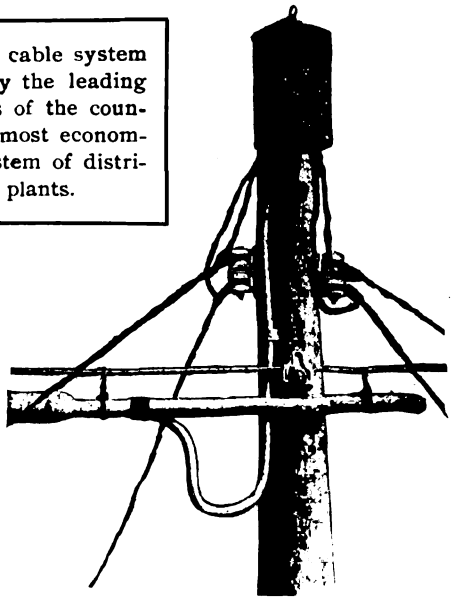
POLE OF THE FUTURE

Poles made from High Carbon Steel are almost indestructible

The Steel Pole is artistic, durable and reasonable in first cost

No poles to rot.
No cross arms to rot.
No glass insulators to break.
No crossed wires to interfere with service.
Trees do not interfere.
Sleet storms lose their terror.
No unsightly cross arms and wires on the streets.
No bare wires to break and fall on electric light wire and kill some one passing by.

The multiple tap cable system is acknowledged by the leading telephone engineers of the country to be by far the most economical and durable system of distribution for telephone plants.



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The undersigned is a pioneer in the multiple cable distribution and makes a specialty of

Planning Cable Layouts
Multiple Cable Distribution
Equipping for Party Lines
Rate Raising, Etc., Etc.
Plans, Specifications and Supervision of Installation of Complete Telephone Plants

WILL GUARANTEE TO INCREASE THE DIVIDENDS IN 99 TELEPHONE PLANTS OUT OF EVERY 100

Engineering, constructing and putting plants on a dividend-paying basis a specialty.

There are many serious mistakes made in the selection of apparatus, construction and maintenance of telephone plants due to lack of experience.

There are many leak holes in a telephone plant unless properly watched.

With proper co-operation on part of owners of telephone plants, I will guarantee to make any Telephone Plant pay dividends or increase your present earnings. Can refer you to a number of telephone plants where I have saved thousands of dollars in first cost of the plant, increased the earnings, improved the service, decreased the operating expenses by installing proper apparatus in the proper way and properly organizing the working force. Can furnish expert engineer, wire chief, auditor, solicitor, chief operator, each a specialist in his line.

LEROY W. STANTON

Consulting and Constructing Telephone Engineer

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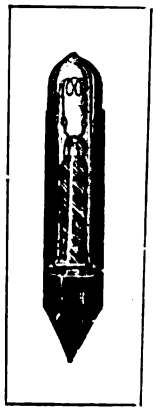
ARE THE

Standard for Visual Signals

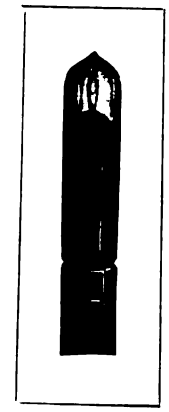


They save the Exchange time and money because Every lamp is perfect—Sure to fit—Sure to burn—The life is extremely long—running into years.

Be sure to get the

EDISON

Orders for any quantity promptly filled.



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Locust and Oak Insulator Pins,
Oak Brackets, Pole Steps
Prompt Shipments. Write for Prices
The W. M. ABSHER CO.
North Wilkesboro, N. C.

M. LANZ & SONS
Manufacturers of GALVANIZED and PLAIN POLE STEPS, BRACES, BOLTS, WASHERS, PETTER DRIVE LAG SCREWS, GUY RODS, GUY CLAMPS, THIMBLES, ETC.
PITTSBURGH, PA

Pendleton & Gilkey
816 Lumber Exchange,
Minneapolis, Minn.

POLE PRODUCERS.
We are producers and save you the jobbers' profit. That's why our prices are lowest. A trial order will convince you. Also that our ***White Cedar Poles*** are the finest in the land. Write for prices F. O. B. your town.

AN AMERICAN JOURNAL For AMERICAN INDEPENDENT TELEPHONE MEN
Read from Atlantic to Pacific; Canada to Mexico; and overflows into all other countries.

BRACKETS--X ARMS--PINS
Little things it is true, but they cut a big figure in line construction.
OUR MOTTO IS:
Prompt Shipment—Quality Satisfaction—Right Price
COLUMBIA MFG. CO. ANTIGO, WIS.

W. C. STERLING & SON
MONROE, MICH.
Telephone Poles
Wholesale Producers 20 Years Eleven Pole Yards

We Rush Orders...
COHN & BOCK
YELLOW PINE CROSS ARMS
Oak Insulator Pins and Brackets

PRINCESS ANNE - - - MARYLAND

..KESTER..
Self Fluxing Solder
A Tube of Solder Filled with Flux.
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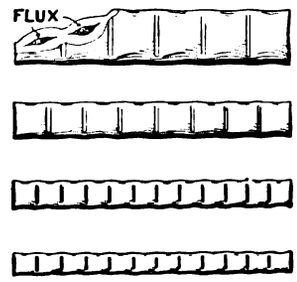

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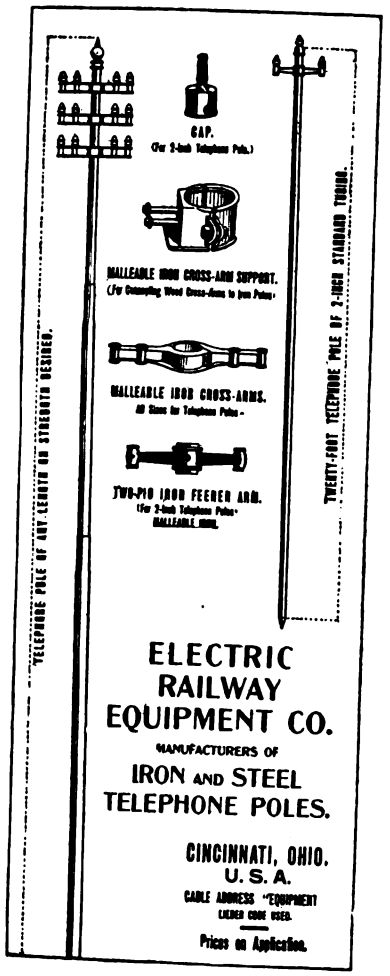

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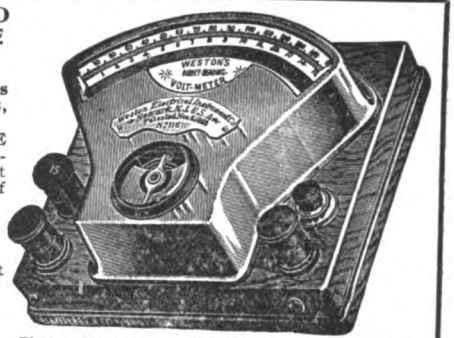

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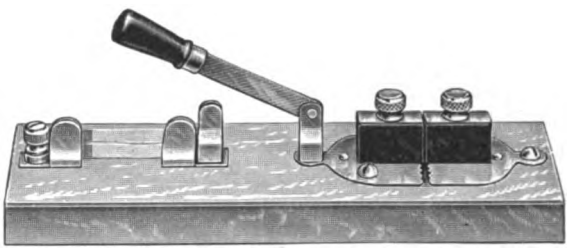

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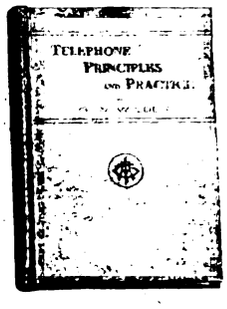

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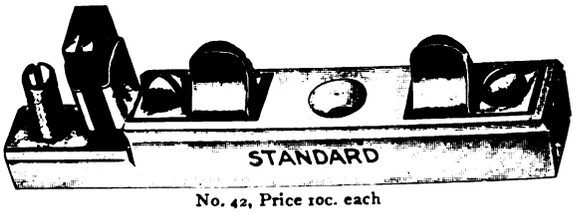

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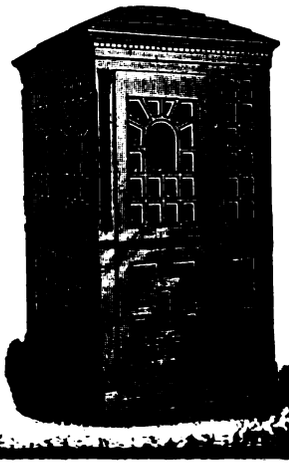

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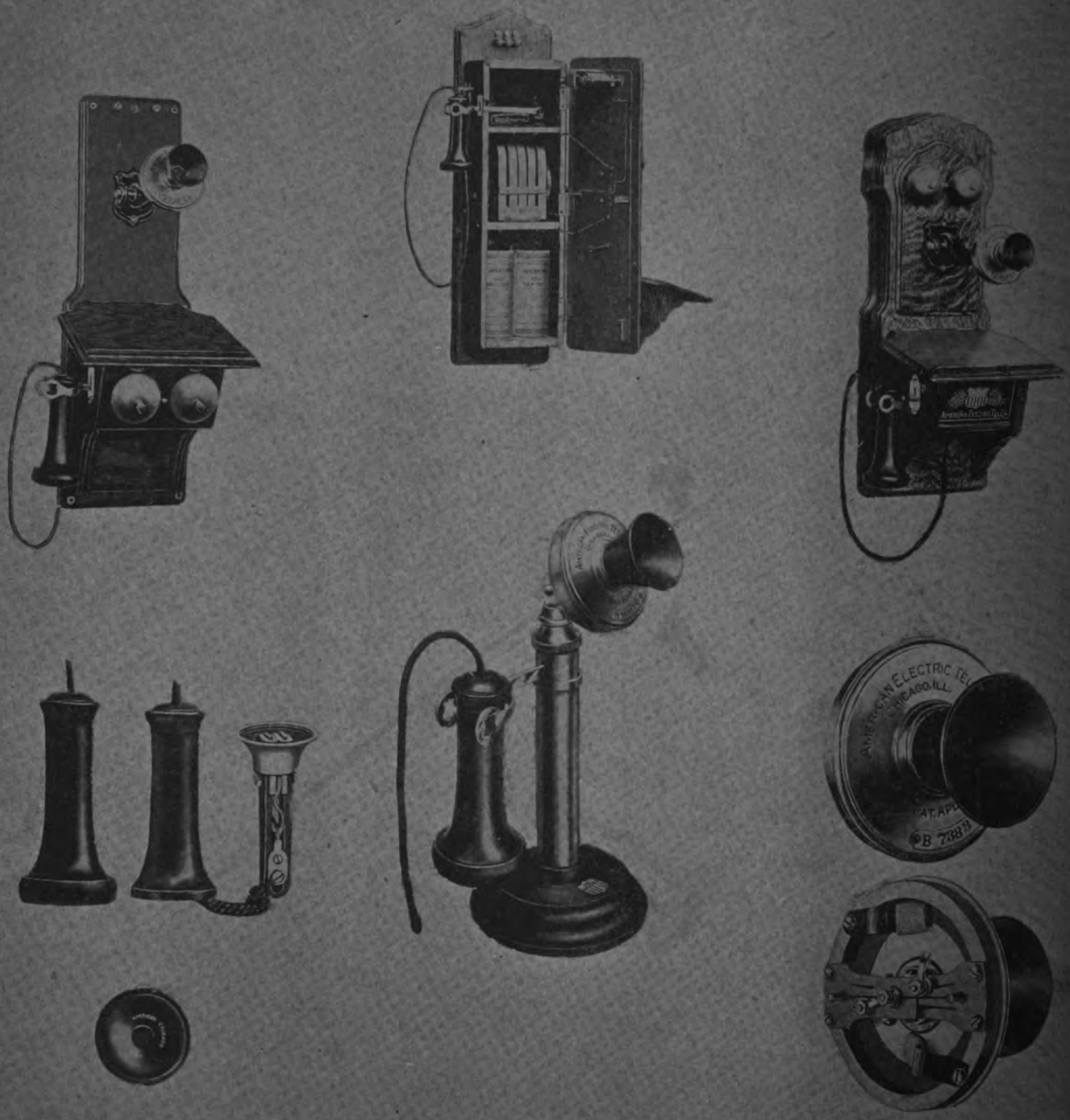

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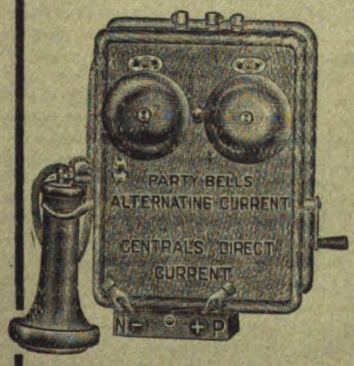

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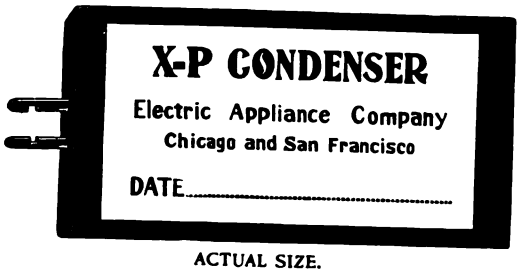

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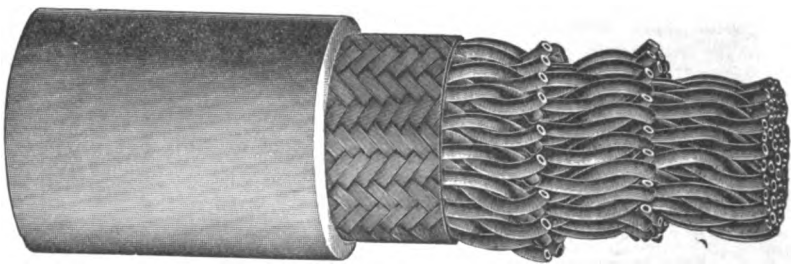

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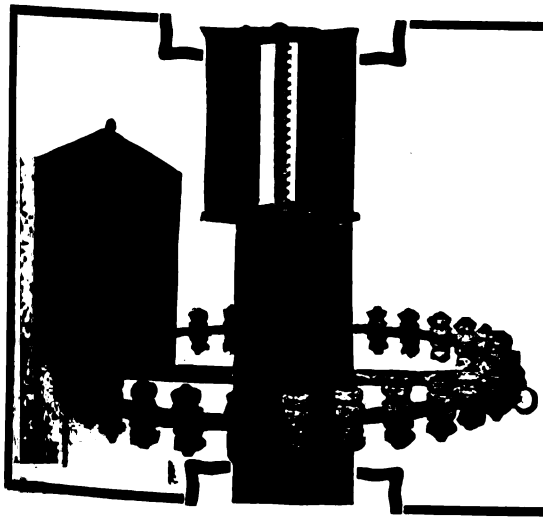

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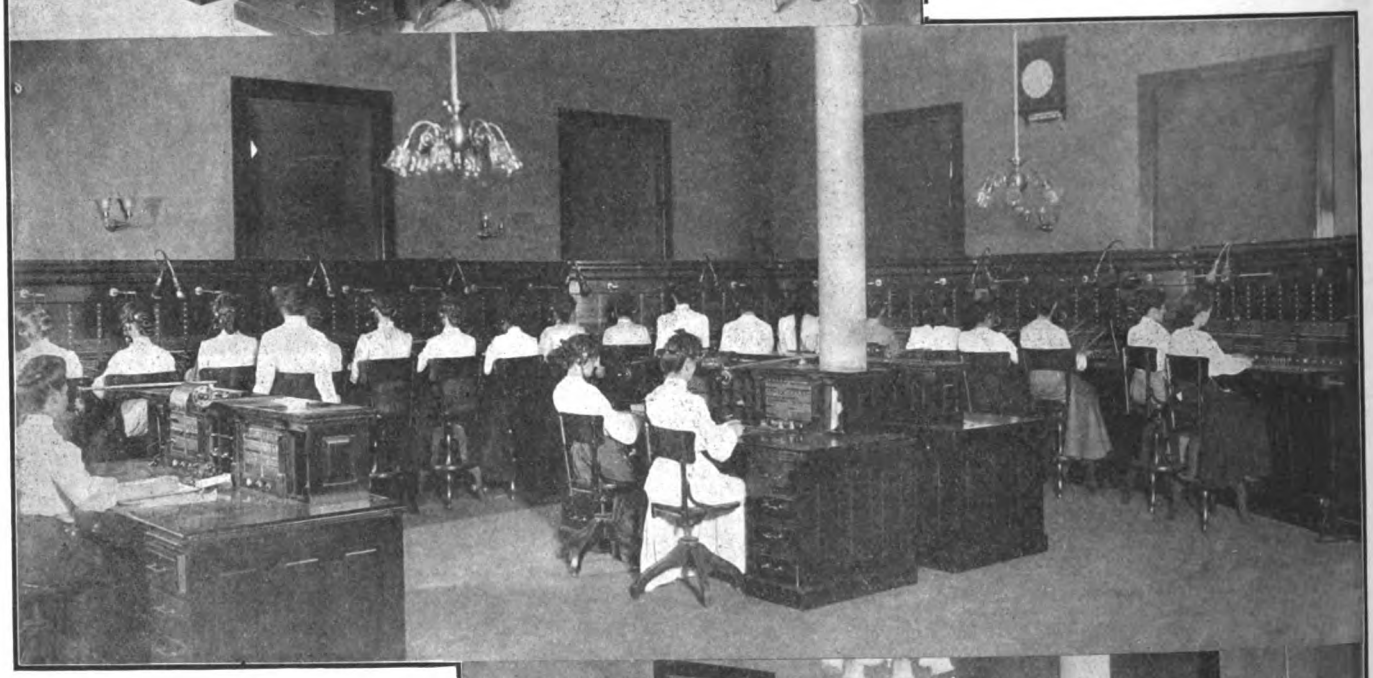

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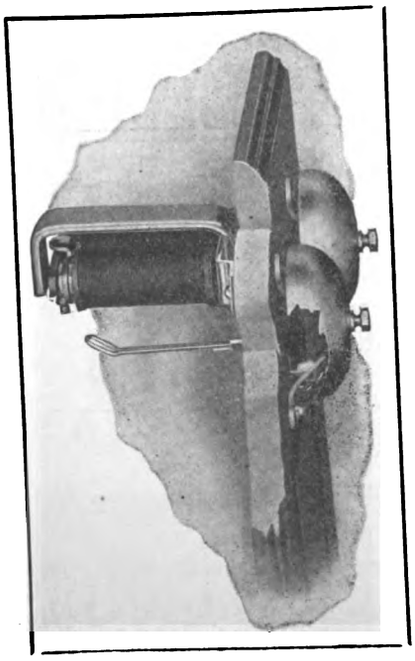

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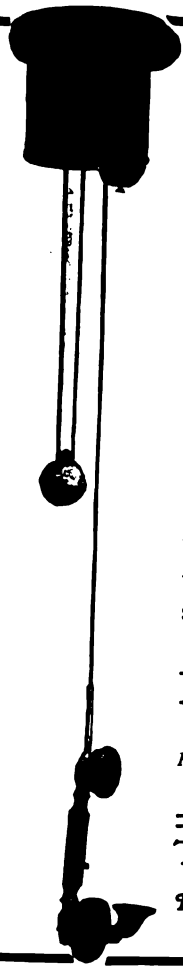

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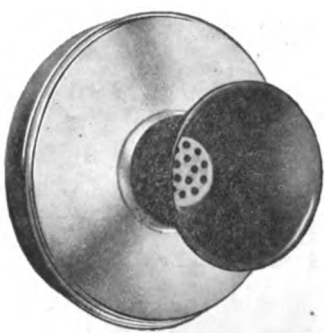

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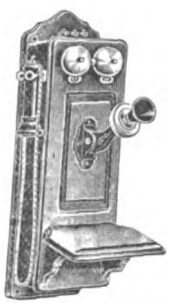

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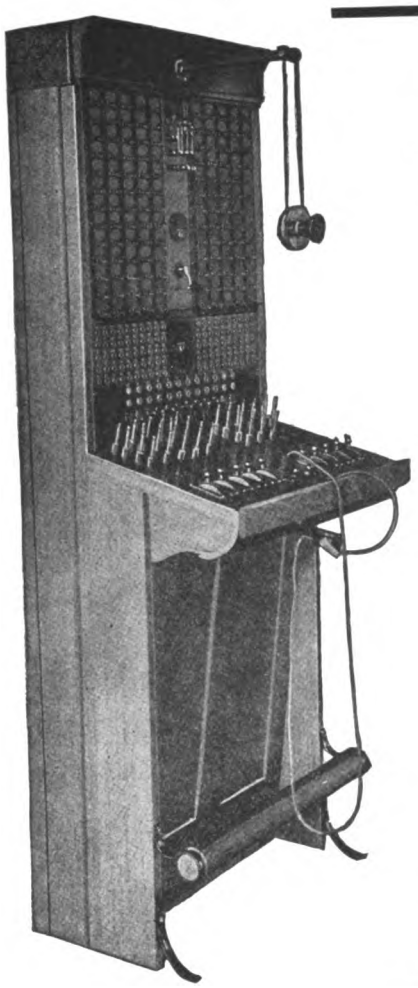

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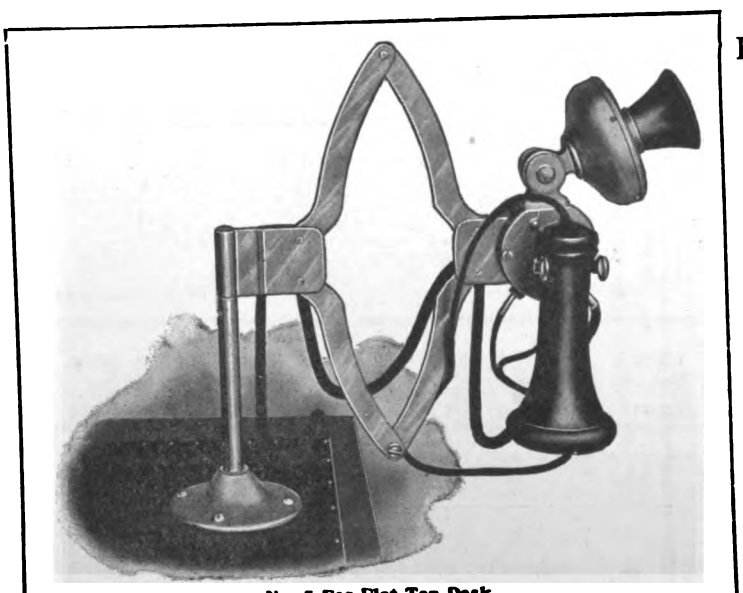

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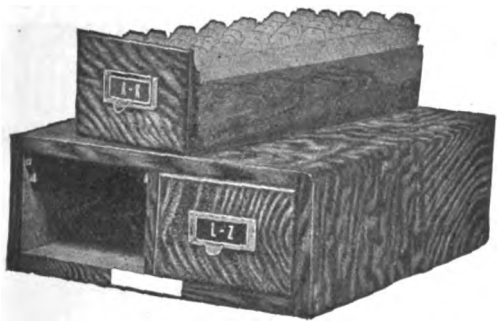

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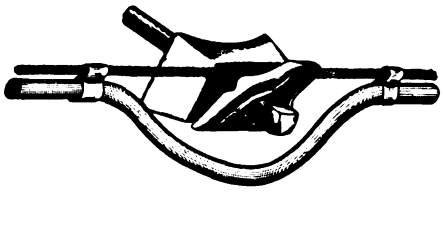

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VOLUME 10 *SATURDAY, OCTOBER 1, 1904* *NUMBER 14*

THE MAN OF THE HOUR IN THE INDEPENDENT TELEPHONE MOVEMENT

By ANTONIO WEST.

JAMES B. HOGE, the newly elected president of the National Independent Telephone Association of America, is one of the most interesting figures in the Independent field. His association with Independent telephony started in 1898, and since that time he has been using his best efforts to place the companies with which he has been connected upon a sound financial basis. Mr. Hoge is also a typical illustration of the American business man, and in both connections a short biography may be interesting to our readers.

He was born near Flushing, in Belmont County, Ohio, on December 20, 1866, his parents being Byron M. Hoge and Tamzen L. (Merritt) Hoge. The early part of his life was spent upon his father's farm, where his father still resides, his mother being deceased. The Hoge family can trace ancestry back to a long line of sturdy Scots, the first of whom came to America as early as 1650 and settled in Virginia. In the latter part of the 17th century the family moved to Ohio, where it has since remained.

James B. Hoge.

Mr. Hoge secured his early education at the village school near Flushing. When 16 years of age he took up the study of bookkeeping, telegraph operating and other railroad work, employing his services, when possible, by delivering messages for the Western Union Telegraph Company at Flushing. At 18 years of age he accepted a position as night telegraph operator for the Cleveland, Lorain & Wheeling Railroad at Bridgeport, Ohio, where he remained for two years, occupying various positions with this railroad and its allied interests. In 1888 Mr. Hoge was transferred to Lorain as chief clerk for the Cleveland, Lorain & Wheeling and Nickel Plate Railroad, which position he filled for nearly three years, when he retired from the railroad business and organized the Lorain Savings and Banking Company, of which he became secretary and treasurer. In 1894 he was elected secretary of the Lorain Chamber of Commerce. During that year arrangements were made for the Johnson Steel Company to move their works from Johnstown, Pa., to Lorain. Besides this, the Chamber of Commerce negotiated a number of improvements for the city, among other things undertaken being that of securing a telephone company for the thriving village, then having a population of about 6,000. The Bell Company refused to build an exchange unless they were guaranteed fifty subscribers at $54 per year. Although the basic patents had not yet expired, the subject of this sketch organized a syndicate to build an exchange, with the result that it was placed in operation before the close of that year. At the present time this exchange has over 1,600 subscribers, and the Bell less than 15 telephones in that city.

While secretary of the Lorain Savings and Banking Company, Mr. Hoge became connected with the Everett-Moore syndicate. The head of this organization recognizing his ability, in 1898 made him secretary of the U. S. Telephone Company, when he moved to Cleveland, resigning his position in the bank he had organized and made a prosperous institution. Mr. Hoge still holds the position of Secretary of the U. S. Telephone Company, and also that of vice-president of the Federal Telephone Company, to which position he was elected later on. He organized the Citizens' Gas and Electric Company, of Lorain and Elyria, consolidating the electric light and steam heating interests of those cities into one organization, later selling them to the Union Natural Gas Corporation, of Pittsburg when natural gas was found in Central Ohio.

Mr. Hoge is a member of the Union Club, of Cleveland. He is a whole-souled gentleman, and, although a busy man, is always ready to give attention to those who desire to consult him. Never having the time nor the inclination to take a hand in political affairs, he has never held a public office.

In 1891 Mr. Hoge was married to Anna Wallace, of Lorain, and three children have blessed the union—Rachael, aged 12; Eleanor, aged 10, and Wallace, 2 years old.

Success or failure in a business enterprise is nearly always traceable to the governing head. No matter how good or how well designed the institution may be, the selection of the dominant power is a task which requires a very great deal of foresight and knowledge.

The National Independent Telephone Association has secured in Mr. Hoge a man with an indomitable will and energy, who is well able to pilot its affairs. The amount of work to be done in the direction of the association's interests could not be placed in better hands than in those of its new president. Co-operation is the keynote of success, and, as was recently said by Senator Flynn, its great value will come from quick organization. Mr. Hoge is thoroughly capable of organization, and if he secures the right sort of co-operation, the success of the National Independent Telephone Association of America is assured.

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PLANNING A TELEPHONE SYSTEM

By Samuel G. McMeen.

I SUPPOSE a good many of you are saying: "I hope it won't be a long story; I hope he has not put in a lot of figures." Well, it isn't; and I haven't.

If all the towns were about alike in the ways their people are distributed over the town's territory; if the prices of materials did not change; if no improvements were made in machinery and supplies; if there were reasonable expectation that styles and fashions in telephone things would be constant; if it were just as easy to dig holes and ditches in the ground in one town as in another; if the people in one town were just as wealthy as in any other, and if the long distance line systems were now complete enough to cover the continent, then planning a telephone system would be easy.

In such ideal conditions a person with the telephone fever might place an order with the manufacturers for "one standard equipment of so many stations," and with the contractors for "one standard system of so many lines." And there would be a great final gratification in the fact that the real investment would be found very much like the original estimate; a condition which happens so seldom as to be quite striking when it does occur.

A certain gentleman who wanted to overhaul the plumbing in his house declined to give money to charity when requested. His reason was that he was about to spend several thousand dollars on his house, as the estimate alone was $350. Some of the people who have been attracted to the telephone business because it seemed to be cheap and easy may drop a tear of sympathy.

It is no news to say that a plan for a telephone system, whether it includes merely an exchange for a town or a toll line system as well, must plan to build the system at the lowest possible cost in investment, and the lowest possible costs of operating the thing when done, keeping it in operating condition, replacing parts of it when they are worn out, and replacing other parts at just the time it is wisest to do so to get the advantages of newer and better ways. There is a real difference between the annual cost of keeping the thing in operating condition, ordinarily called "maintenance," and the annual cost of replacing parts which are no longer serviceable, due to their having worn out or become superseded by something better.

It has been supposed that the cost of operation depends mostly on good management, and this is probably true; but the more recent development of automatic apparatus is causing some of the old-timers in the business to sit up and take notice. I do not mean to say that it is always cheaper to make the connections by machinery than by hand, but that there is much more reason now to believe that such a result may be reached than there was five years ago.

To accomplish the lowest cost in investment does not always mean lower annual costs in maintenance, depreciation and operation. You have seen systems which impressed you as having come into being largely by accident; in some of these a little inspection of the accounts will show such annual sums of unnecessary outlay as are really adding substantially to the effective investment. As a fundamental principle, it is supposed to be best to run your business on your own capital; but there are many telephone exchanges in which borrowed money applied in betterments would pay interest on itself, and a substantial profit besides. This because of the greater saving, even though the borrowed investment did not increase the gross revenue at all.

Differences of opinion among telephone men as to the right number of offices to establish in a fairly large city have been supposed to be due to the natural tendency of men not to agree with each other. In large cities in Europe there exists a liking for one central office, with a large number of lines. In the larger cities in the United States it is quite usual to prefer a number of offices.

The explanation is very simple. As telephone systems are now built, a very large part of the annual cost of merely owning the system a year at a time is in the wire plant; and this in a large city of only reasonable density of population varies strikingly with different arrangements of the lines in offices; when they are centered in one office it is quite the rule that the average length of line is greater than when part of the lines center in one office and other parts in others. It is true that where there are several offices in a city these must be joined to each other by trunk lines; but as trunk lines are so heavily used, it is never true that the total amount of wire in subscribers' lines and trunks is as great with several offices as it is with one.

In the cities of Europe a great many more people live in a given space than here. The lines are therefore shorter. Labor is cheaper. And in some cases a one-office arrangement was chosen because the engineers made a bad guess.

If there were no other reasons to be considered, more than one office in a town would generally be cheapest; but, fortunately or unfortunately, the cost for operators is always greater in the several-office arrangement than in that of one office. But in any town whatever, an arrangement can be found in which the total cost of owning and operating and keeping up the lines and offices, when taken as a whole, will be the least. In laying out a system of reasonable size, finding the number of offices and where they ought to be is one of the important considerations; and is a condition which, if poorly established, can absorb a surprisingly large amount of money each year.

In a small city, one office is nearly always the best arrangement, and in the past it has been customary to assume that this would be so, and to plan accordingly, leaving the consideration as to what future arrangement might be best to be taken care of by the future. It has resulted—and will result again—that it is found that the one-office originally established is in a surprisingly bad place when the day does come that others must be opened. By being in a bad place I mean simply that when additional offices are established, this first one may be found by its location to be adding to the annual cost of owning, operating and keeping up the system.

In establishing any office, even if the exchange be small, wisdom of choice is required with reference to the location of the building, its size and its character. I have pointed out that the location of the building has an effect on the length of lines. It also has an effect on the fire risk, and sometimes there is also a risk from high waters. Service has been interfered with by fire in an adjoining building, even though there was no immediate danger to the central office itself. Whether the building be owned or rented, the arrangement of the apparatus in it is best when not only the exact location of future additions is taken into account, but when a growth of unexpected amount is provided for. Instances have occurred where a plan otherwise good has been found to be very bad beause the growth was great enough to carry the switchboards against a wall which could not be removed and in which direction the building could not be extended.

The best central office arrangement, other things being equal, is that which carries the entering cables, and those which are joined to them, through their runs with the greatest directness, and therefore at the smallest cost. In the larger offices a saving of a foot length in a cable run is a very considerable advantage.

As to choice among the many types of equipment now available, one may gain a great deal of information from the manufacturers, as they will tell you all about the good points of their own manufacture, and sometimes about the bad points of that of others. A great deal of light is thrown upon the situation, and the embarrassment of choosing is much relieved by the application of a few simple but exacting tests to samples submitted by the manufacturers. In every case the prospective purchaser has a great advantage if he purchases in accordance with definite specifications covernig his exact needs, because those things not only assist the manufaturer in knowing exactly what is called for, but

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assist the purchaser in protecting himself in case the things delivered are not satisfactory.

In all except the very smallest offices, careful planning of the equipment will usually make a saving in the expense of operators. Where local and toll duties devolve on the same operator during quiet hours, economy and convenience may both be accomplished by an intelligent arrangement of the switchboard locations.

Since the first introduction of lead covered cables there has been a decrease in the use of bare open wires. Except as to the cost of the system, there is no reason why all wires should not be in cables. Where the development is very dense, it is really cheapest to carry cables directly into the buildings, but in residence districts it is best to strike a happy medium between all cables and all open wire. Because a subscriber should be connected as soon as his contract is secured; because to do so means a line must be ready for him in advance; the future development of the residence districts can be guessed with less exactness than the denser districts, it is necessary that the multiple tap method of distributing cable conductors be used at least in some degree. If intelligently applied, the multiple tap method also reduces the wire plant cost below that of the more cumbersome open wire treatment of line ends, with its attendant maintenance expense, and annoyance of service interruption.

Like many other good things, however, the multiple tap system may be practiced to excess. There is no involved mathematical formula which will answer the multiple tap question for a given town, but it is possible and necessary as well to make comparisons between the costs of several arrangements for a given territory. And these comparisons should be made with care enough, and patience enough, to make certain that the best way has been chosen when a conclusion really is reached.

In recent times quite substantial changes have taken place in the costs of things which go to make up the wire plant. It is gratifying that this is so, because this part of the system has always been predominant in using up investment. No matter how cheap, however, the materials for line construction may become, the proportion of labor cost to the total cost of the constructed thing will remain large. As a comparison, it may be interesting to know that the equipment for central offices and subscribers may be installed for from 5 per cent. to 10 per cent. of its cost, while very many of the elements of line construction cost as much for labor as for material. A thing which the constructor, therefore, must plan toward is the elimination of labor wherever possible.

There are two good results of such watchfulness; one is the natural keeping down of the total cost, and the other a higher final depreciated value. For if it costs a dollar to put a dollar's worth of copper in place, 50 per cent. is more than you can ever get out of it by selling it as junk. This is one of the reasons why placing cables under ground has had such an effect on annual telephone costs. Two cables just alike, one on poles and one in ducts, may reasonably be expected to have an annual depreciation cost of several to one in favor of the underground cable; and this without taking into account the superior lasting qualities of the structure which cares for the latter.

Without citing further examples, I think I may generalize by saying that it is necessary to apply these and other simple rules to the planning of a telephone system for a town, and to lay out the course of action which, when methodically pursued, will bring the originate estimate and the actual cost reasonably close together, not only as to the first investment, but to the annual charges when in service.

Not the least important thing in preparing to make such a plan is to get on the ground, and become saturated with the local facts. It is gratifying to find by experience that an outsider may get such a knowledge of a town by tramping over it, by consulting public records, and by diligent inquiry from those who know, as to enable him to compile field notes almost as accurate as to the things he needs to know as those taken by the civil engineer in laying out a railroad.

By this I do not mean merely finding out what is under the pavement, and where there are alleys and where none, because these are simple matters. The important thing is to get so many facts about the town as to enable correct guesses to be made as to where the future growth of the town will occur, about how fast it will go on, and in what direction it will push; what kind of houses will be built in this quarter, and what kind in that; the probable change in the business area, and its present tendency of expansion; is the street railway system going to develop this residence area more than that, or will a new district spring up next year? One of the greatest helps toward reasonably correct conclusions in this plodding sort of investigation is to cut it up into such small pieces that the great quantity of estimates will prevent a serious error being introduced by a few bad ones. In five hundred guesses the influence of one wrong one is not only relatively small, but each guess is easier to make with truth.

In all of these cases the elements of estimate are made with a view to determining not so much what the town is to-day, but what it will be at the end of a selected period. It is not difficult to build a system for the present for a town of known conditions. It is more difficult, and more important as well, to make the plan complete for the town which is to be, because it is that town which the system must serve. The only difference between the best method of planning to-day and those which have been used heretofore is that the later method uses more care in details, and realizes more fully the kinds of mistakes which are likely to be made. Perhaps it reflects little credit on the engineers, but it is distinctly to the advantage of their employers that they have made almost all the blunders that are possible to be made; and it goes without saying, of course, that a man of reasonable common sense will not make the same mistake twice. If it were only long-lived enough, this tendency might result in quite a perfect telephone condition being reached.

So far as I have described the manner of such planning, it has been in the way of accomplishing minimum costs. It goes without saying that the minimum cost plan must involve due consideration of the quality of service to be given. A plan which will not make good service falls short of its mission, quite as would a manufacturing property which would not turn out good product. This brings me to the very important and widely neglected feature of planning all parts of a telephone system, whether in a town or between towns, so that it may ultimately form a part of a successful continental telephone system. I do not mean by this merely that a consolidation of telephone interests may take place. What I do mean is that any plan falls short of its mission which does not involve making all elements as nearly as may be such as will be serviceable and useful when the continent is covered with a complete network of long distance lines, connecting exchange with exchange. You may answer that the day of such a system is so far away that it is foolish to waste money on it now. My answer is that the day in question is not so far away as many are thinking, and that it does not always mean an excess expenditure to take this into account. Further, in any telephone system which is wisely planned there are elements which ought to last so long as to be overtaken by the time of which I speak. It is no fancy dream to expect such a condition. We will agree on this if we will stop to think of what has been accomplished by the Independent interests already. I am advised that there is under consideration the construction of a considerable length of long distance circuit of heavier copper than has ever been erected for any purpose of communication, and this by an Independent company. I can call to mind exchanges lying in the region of these excellent projected circuits from the stations of which I should be surprised to receive good speech even over lines of such cost and quality.

It may be that I have harped too much upon patience, persistence and common sense, and not enough on experience and preparation. It is true, of course, that these are necessary also. If there is one thing which has been of value in developing the telephone business, it is experience, and its application to the new things always arising. The successes that are to come will result from an intelligent use of what can be learned by a proper study of what has been done already.

EDITOR'S NOTE.—Paper read before the Convention of the National Independent Telephone Association of America at St. Louis.

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CONSTITUTION OF THE NATIONAL INDEPENDENT TELEPHONE ASSOCIATION OF AMERICA

ARTICLE I.

The name of this Association shall be THE NATIONAL INDEPENDENT TELEPHONE ASSOCIATION OF AMERICA.

ARTICLE II.

The aim and purpose of this Association is to cement together in a firmer union all Independent telephone interests in the United States for the purpose of promoting uniformity of operation, maintenance and construction; to protect and defend the members of this Association by moral effort, co-operation and such other means as may be available; and any and all other purposes that are to the best interests of the members of the Association.

ARTICLE III.

OFFICERS OF THE ASSOCIATION. The officers of this Association shall consist of not less than 15 Trustees, one of whom shall be elected from each State having members or associations affiliated with this body; and as many more as may be necessary to give each State affiliated with this body one representative; a president, first and second vice-presidents, a secretary and a treasurer (which latter two offices may be filled by one and the same person).

The president shall be a member and ex-officio chairman of the trustees.

ARTICLE IV.

COMMITTEES. The president shall within 15 days after the annual meeting appoint an executive committee of 8 members, who, with himself, shall constitute a committee of 9 to be known as the executive committee of the association. The appointments made shall be approved by the two vice-presidents, treasurer and secretary, or a majority thereof and in case any appointment should not be so approved, the president shall appoint some one else agreeable to them to fill the place. The president shall also fill all vacancies in said committee within 30 days after they occur, subject to the approval of the foregoing officers.

ARTICLE V.

ELECTION OF OFFICERS. The officers herein provided for other than the executive committee shall be elected by ballot, upon the adoption of this constitution, and thereafter by ballot at the annual meeting each year, and shall serve until their successors are elected and qualified.

ARTICLE VI.

LITIGATION AND LEGISLATION AND OTHER COMMITTEE. There shall be appointed within 30 days after the annual meeting by the president, a committee composed of five members which shall be known as the committee on litigation and legislation, which shall have charge of all legislation affecting the interests of the association, and inquire into all litigation that might affect the interests of the association or its members. The chairman shall appont such other commttees as the association may from time to time direct; said committees to be approved by a majority of the other officers as heretofore provided.

ARTICLE VII.

ANNUAL AND SPECIAL MEETINGS. The annual meeting each year shall fix the time and place of the annual meeting for the following year and special meetings may be held at such other times and places, as the executive committee may from time to time direct. The call for any such special meetings shall set forth the subject or subjects to be considered at such special meetings and no business affecting the general interests of the association shall be disposed of except as specified in the call.

ARTICLE VIII.

MEMBERSHIP. Any State, district or local organization representing a majority in interest in such district of Independent telephone exchanges, or telephone toll lines in the United States with not less than 500 units, (each unit to consist of either one operating telephone or one mile of long distance toll line) and having subscribed to this constitution, shall be eligible to membership in this associaton upon an affirmatve two-third vote of the members present at any regular or called meeting of the association; provided, however, that application may be made in the interim between meetings to the executive committee who may pass upon such applications; and further provided, that the units represented by any such organization shall not be represented by any other organization in which they may have membership; and provided further, that after the State organization is completed in any State (or Territory), representing a majority of the Independent telephone or toll lines in such State (or Territory), district or local organizations in such States, shall not be eligible for separate membership in this association, except upon the recommendation of the State organization, or when after direct application to this association, that the reason for such direct application is valid and reasonable, whereupon they may be admitted by a two-thirds affirmative vote of the association and in no other way. Membership in this association, however, shall be contingent upon the payment of assessments levied as provided for in the following paragraph.

ARTICLE IX.

ANNUAL DUES. The annual dues shall be levied from time to time by the executive committee through the treasurer, who shall send out the call 30 days before the same is payable, which shall not exceed one cent per telephone or mile of toll line circuit per year.

ARTICLE X.

REPRESENTATION. The several State, district or local organizations being members of this association shall be represented at the annual or special meetings of this association, by delegates chosen or appointed by such State, district or local organizations, in such manner, as may be prescribed by the constitution and by-laws of such organizations, but the number of delegates so chosen shall not exceed 1 for each 10,000 units or majority fraction thereof, as prescribed in Article VIII hereof. The members shall be entitled to one vote for every 10,000 units or majority fraction thereof, local organizations having less than 10,000 units shall have such fractional vote as they represent.

ARTICLE XI.

QUORUM. A majority of all the delegates present at the annual meetings of this association, or special meetings thereof, duly called, shall constitute a quorum for the transaction of business.

ARTICLE XII.

DUTIES OF PRESIDENT. The president shall preside at all the meetings of the association, board of trustees and executive committee and shall approve and countersign all orders drawn on the treasurer thereof, and shall be the general executive officer of the association, for the purpose of carrying on the business of the association; and perform such other duties as may be prescribed by this constitution or the association.

ARTICLE XIII.

DUTIES OF VICE-PRESIDENTS. The duties of the vice-presidents shall be to act in their order in the absence of the president, and perform such duties as would devolve upon the president, if personally present. They shall act upon appointments made by the president as heretofore provided, and perform any other duties prescribed by the constitution of this association.

ARTICLE XIV.

DUTIES OF SECRETARY. The duties of the secretary shall be to keep the records of this association and notify all members of any general or special meetings of the same to be held; draw all orders upon the treasurer after approval by the president and auditing committee and perform such other duties as the executive committee may require.

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ARTICLE XV.

DUTIES OF TREASURER. The duties of the treasurer shall be to collect all moneys from the members of the association and to safely keep and pay out the same upon the order of the president, duly approved by the auditing committee. He shall also be custodian of any contracts or other papers except the records of the proceeds of the association. He shall give bond of some approved surety company for such an amount as may be required by the executive committee; said bond to be approved by executive committee and paid for by the association.

ARTICLE XVI.

DUTIES OF TRUSTEES. The trustees may be called together at any time by the executive committee upon ten days' notice; the notice shall specify the object and necessity for calling the meeting. A majority shall constitute a quorum for the transaction of business. It shall be their duty to meet at the place of holding the annual convention, the day preceding the first session of the convention at 10 o'clock A. M. At that time they shall appoint a committee of three to audit the books and vouchers of the association and report their findings to the convention. They shall hear reports of the officers and executive committee, recommend a policy to be pursued by the association at their convention.

ARTICLE XVII.

DUTIES OF THE EXECUTIVE COMMITTEE. The duties of the executive committee shall be to co-operate with the officers in the promoting the interests of the association; they shall have the right to create the office of assistants to the secretary or treasurer and employ one or more persons to fill those offices, who shall give their entire time to the interests of the association. They shall appoint an auditing committee of three, whose duty it shall be to audit all bills of the association before payment is made. They shall fix salaries of all officers and employees; said salaries to cover actual time spent in the interests of the association. They shall be allowed actual traveling expenses when on the exclusive business of the association; they shall assist the officers in doing all things necessary to make the organization a success.

ARTICLE XVIII.

MEMBERS OR OFFICERS CEASING TO BE INDEPENDENT. Any member or officer becoming in any way connected with other telephone interests than those identified with the Independent Companies, shall be regarded by the executive committee as having tendered their resignation to said association. Any one becoming a member of or accepting an office in the association does so with the above understanding; and the executive committee shall in case of resignation of officers, appoint their successors until the next regular or special meeting of the association, when the vacancies shall be filled.

ARTICLE XIX.

COMMITTEES AT ANNUAL MEETING. The president shall appoint at the first session of the annual meeting, the following committees:

Committee on credentials.
Committee on nomination.
Committee on next convention.
Committee on amendements to constitution.

ARTICLE XX.

ORDER OF BUSINESS.

1. Meeting to be called to order by president.
2. The election of chairman.
3. Reading of the minutes of the last meeting by the secretary.
4. Report of officers and committees.
5. Appointment of committees, regular and special.
6. Program.
7. Hearing reports of committee.
8. Election of officers.
9. Transaction of miscellaneous business.
10. Presentation of new business.
11. Adjournment

ARTICLE XXI.

BY-LAWS. The executive committee may, in its discretion, adopt such by-laws as it may deem expedient, not inconsistent with this constitution.

ARTICLE XXII.

AMENDMENTS TO CONSTITUTION. This constitution may be amended at any annual meeting of the association by an affirmative vote of a majority of the members present; or at any special meeting of which due notice by mail shall have been given at least thirty days previously to every member of the association, when such notice shall specify among other things the sections of the constitution proposed to be amended and the amendments offered thereto.

REPORT OF CONVENTION OF MUNICIPAL ELECTRICIANS

THE ninth annual convention of the International Association of Municipal Electricians met this year at St. Louis, Mo., on Tuesday, Sept. 13. The meeting was called to order by President Farrand, of Atlantic City, N. J., at 9:30 A. M., in the Grand View Fraternal Hotel, who, in his annual address, congratulated the members on the fact that the meeting was to be held during the week of the Electrical Congress, when the exhibitors at the Exposition would be able to show them special courtesies. He also urged the members to special efforts to increase the membership of the Association, and in that way increase its field of usefulness.

Mr. Adam Bosch, of Newark, N. J., read a paper entitled "Limitations of the Telephone for Fire-Alarm Purposes," taking the position that the telephone should not be depended on as an alarm system, as it was more liable to mistakes than the regular automatic systems. The majority of the members took part in the discussion of the paper, agreeing with the writer.

Mr. W. H. Thompson, of Richmond, Va., wrote a paper on the "Inspection of Theaters from an Electrical Standpoint," but he was taken ill and unable to attend the meeting. His paper was read by the secretary.

Mr. Hatch read his paper, "Street Lighting."

"Methods of Testing" was the title of a paper prepared by Walter M. Petty, of Rutherford, N. J., and was given the best of attention by the members, and a general discussion followed.

The officers elected for the ensuing year resulted as follows: Walter M. Petty, Rutherford, N. J., president; J. B. Yeakle, Baltimore, Md., first vice-president; G. H. Holderman, Indianapolis, Ind., second vice-president; C. E. Diehl, Harrisburg, Pa., third vice-president; Charles Greenwald, New Brunswick, N. J., forth vice-president; Frank P. Foster, Corning, N. Y., Secretary; G. F. Macdonald, Ottawa, Canada, treasurer. Executive Committee—Jerry Murphy, Cleveland, O.; Wm. Crane, Erie, Pa.; M. J. Donohue, Niagara Falls, N. Y.; A. S. Hatch, Detroit, Mich.; C. L. Williams, Laurel, Miss. A. C. Farrand, Atlantic City, N. J.; W. H. Thompson, Richmond, Va.; F. C. Mason, Brooklyn, N. Y.; J. S. Craig, Toronto, Canada. Finance committee—W. H. Bradt, Troy, N. Y.; James Grant, New Haven, Conn.; T. C. O'Hearn, Cambridge, Mass., and J. D. Hall, Peoria, Ill.

In the selection of the place for the next meeting Erie, Pa., was the successful city.

On Thursday morning, Sept. 15, the association held a joint session with Section G of the Electrical Congress.

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IN THE OPERATING FIELD.

NORTHEASTERN IOWA TELEPHONE ASSOCIATION.

THE fifth semi-annual meeting of the Northeastern Iowa Telephone Association was recently held in the parlors of the Gedney Hotel, Independence, Iowa. Twenty-five Independent telephone companies were represented. These comprise the entire membership of the association. The meeting was called to order by President Stevens, and the following program was carried out: "The Situation in Our Neck O' The Woods," O. F. Blazier, Rockford, Iowa. "Are Our Relations with Farmers Improving?" by A. H. McClun, West Liberty, Iowa. "Advantages of a More Compact Organization," by E. C. Hampton, Marion, Iowa. "Needed Legislation," by S. G. Elgin, Monticello, Iowa. "Long Distance Lines," by G. Houck, Belleview, Iowa. The session lasted two days, and the entire time was taken up with interesting discussions of the papers mentioned.

George F. Hewes, of the Sioux City Telephone Company, gave an address upon the subject, "The National Monopoly," which was one of the best speeches of the session. He also talked at length on the new automatic system, which is being installed at Sioux City. The regular business meeting of the association occurs each year in February, at which time the election of officers is held. The following is a list of the present officers: President, Victor H. Stevens; vice-president, J. F. Van Vors; secretary and treasurer, S. S. Lichty. The present standing of the association is in a first-class condition, and reports from the various companies intended to show that in general the past summer has been the most posperous in the history of the association.

L. D. LINES OF THE MARYLAND TELEPHONE COMPANY.

DURING the past few months the Maryland Telephone Company has extended its long-distance lines so that now they reach about 2500 cities and towns in Maryland, Delaware, Pennsylvania, Virginia, West Virginia and New Jersey. The subscribers to these lines number about 100,000. The company is completing the connection with Cumberland, Md., which makes possible communication with Pittsburg, Johnstown, Somerset, Erie and other towns in Western Pennsylvania and towns and cities in Western Ohio.

The company hopes soon to give service to Illinois through Independent companies operating in Ohio. The completion of the Cumberland connection, say the officials, will add 2000 cities and towns to the system, embracing about 120,000 additional subscribers.

MEETING OF DISTRICT NO. 4, OHIO INDEPENDENT TELEPHONE ASSOCIATION.

THE meeting of fourth district of Ohio Independent Telephone Association was held at Chillicothe, Ohio, August 30, 1904. This district comprises the counties of Pickaway, Fayette, Vinton, Jackson, Scioto, Lawrence, Pike, Adams, Highland, Clinton and Ross.

Mr. P. G. Thorpe, of Wilmington, vice-president of the Ohio Association, presided at the meeting, and E. E. Knox, of Portsmouth, O., acted as secretary. About twenty towns in the district were represented. Mr. F. L. Beam, of Columbus, president of Ohio Association, made a short talk on the ideas of the State Association.

Mr. J. B. Hoge, of Federal Telephone Company, Cleveland, spoke on general organization. Mr. C. Y. McVey, assistant general manager of Federal Telephone Company, Cleveland, made a few very good remarks on telephone service, and Mr. M. B. Overly, general manager United States Telephone Company, Cleveland, O., told of some of the developments of the long-distance company of Ohio.

The meeting was a very enthusiastic one and augured well for the success of the district organization.

Reports from each county in the district were made by members present, after which committees were appointed and the meeting adjourned, subject to call by the chairman.

ILLNESS OF JUDGE THOMAS.

JUDGE J. M. THOMAS, the former president of the National Telephone Association, is very ill at his home, Irvington-on-the Hudson, in New York State. His physician announces that there is no hope for Judge Thomas, and that at the most he can be expected to live only three or four months. As reported in last week's issue of THE AMERICAN TELEPHONE JOURNAL, the National Telephone Convention in session at St. Louis adopted resolutions of sympathy for its former chief officer, as follows:

ST. LOUIS, MO., SEPT. 23, 1904.

Be it resolved by the Independent Telephone Association of the United States, in convention assembled in St. Louis this 23d day of September, 1904, that it most earnestly deplores the illness of Hon. James M. Thomas, who is at his home in Irvington, N. Y.; that without detracting from the value of the services rendered the cause of Independent telephony by many others, it recognizes in Judge Thomas one who has done more for this cause than any other living man; that from his earnest, honest and unselfish labors in the general cause of Independent telephony, from its real inception until the time of his physical disability, he has not only accomplished a great deal himself, but has stimulated and encouraged others in the work, and to his efforts most largely is due the fact that in nine years there have been placed and are now in operation in the United States approximately two and one-half million Independent telephones.

Be it further resolved that we extend to him the sincerest sympathy of the members of the Independent Telephone Association, and through them for all others who are interested in this cause, and express the most earnest wish for his early and complete recovery.

Committee on Resolutions to Judge Thomas as follows: H. D. Critchfield, Chicago; Geo. W. Beers, Fort Wayne; Hugh Dougherty, Buffalo, Ind.; P. Sheeron, Indianapolis, Ind.; E. B. Fisher, Grand Rapids, Mich.; C. W. Kleine, Hazleton, Pa.; J. B. Hoge, Cleveland, Ohio; F. L. Beam, Columbus, Ohio.

SUB-MARINE SIGNALING FOR ST. LAWRENCE RIVER.

THE Canadian Government, by an order adopted in council at Ottawa, will enter into an agreement with the Submarine Signal Company of Boston for the installation of 30 bells in the St. Lawrence River and off the coast of the Maritime Provinces. Of the 30 stations to be established, 26 are to be operated from the shore and four from lightships.

It is expected that all ships making Canadian ports will be equipped with the telephonic apparatus for picking up the sounds of the bells. Already provisional arrangements have been made with the principal steamship companies of the Dominion for the installation of the apparatus.

The system has been installed experimentally for some months at Boston lightship, Pollock Rip Shoals lightship and Vineyard Sound lightship.

The telephone apparatus on the ships never fail to pick up the sounds of the bells at distances ranging from 4 to 10 miles. As there is no difficulty in locating the direction from which the sounds come, the mariner, by the use of the signal system, is

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enabled to know his position when near a signal station, if he has wandered from his course for any reason, or if he is picking his way through a dangerous passage in fog or storm.

NEXT MEETING OF THE NATIONAL TELEPHONE ASSOCIATION.

JUDGE H. D. CRITCHFIELD, E. E. Clements and J. B. Hoge were appointed a committee at the recent National Telephone Convention to fix a time and place for the next convention. They are to report to the Executive Committee not later than three months before the proposed date, so that a general call may be issued.

CONVENTION DELEGATES RECEIVED SPECIAL ATTENTION.

AT the National Telephone Convention, held last week in St. Louis, the delegates were the recipients of special attentions from the various manufacturers that were very much appreciated.

After the adjournment of the convention the delegates were treated to a trolley ride, as guests of The Controller Company of America, on the private car "Mabel," belonging to Mr. E. G. Lewis, of the E. G. Lewis Publishing Company, who is secretary of the Controller Company. Mr. H. D. Stroud, engineer of that company, was in charge of the party. After a ride through the city the delegates alighted at the Mercantile Club, where an elaborate luncheon was served, after which the tour was continued.

The afternoon's entertainment was ended by an inspection of the now famous Woman's Magazine Building, which is owned by the E. G. Lewis Publishing Company.

Several manufacturers distributed souvenirs to the delegates at the convention. Among them were the Swedish-American Telephone Company, of Chicago, Ill., which presented the delegates with a small neat watch charm, telephone receiver of the same design as their standard receiver. This company also distributed leather blotter pads having an elaborate design and the name of the company stamped on the back.

The American Electric Telephone Company, of Chicago, had a unique souvenir in a small brass nickel plated telephone receiver, useful as a paper weight.

The Central Telephone and Electric Company, of St. Louis, furnished the delegates with buttons and convention badges.

The Kellogg Switchboard and Supply Company, of Chicago, had a very desirable souvenir in a purse whose combination lock caused some consternation and merriment.

INDEPENDENT SYSTEMS OF LEWIS COUNTY, MO.

IN Lewis County, Mo., there are two Independent telephone companies—the Lewis County Telephone Company and the Citizens' Telephone Company of North Missouri. The Bell company has hardly any telephones and these are at toll stations. Both the Independent companies operate in different territories, although in some towns both have exchanges. These systems are kept in first-class condition and the lines are all in good shape. There are country lines on almost every public road in the county, yet ten years ago there was not an exchange in the county and but few county lines. Both companies have cables across the Mississippi, that of the Lewis County system crossing at Quincy, Ill., and the Citizens' lines at Canton.

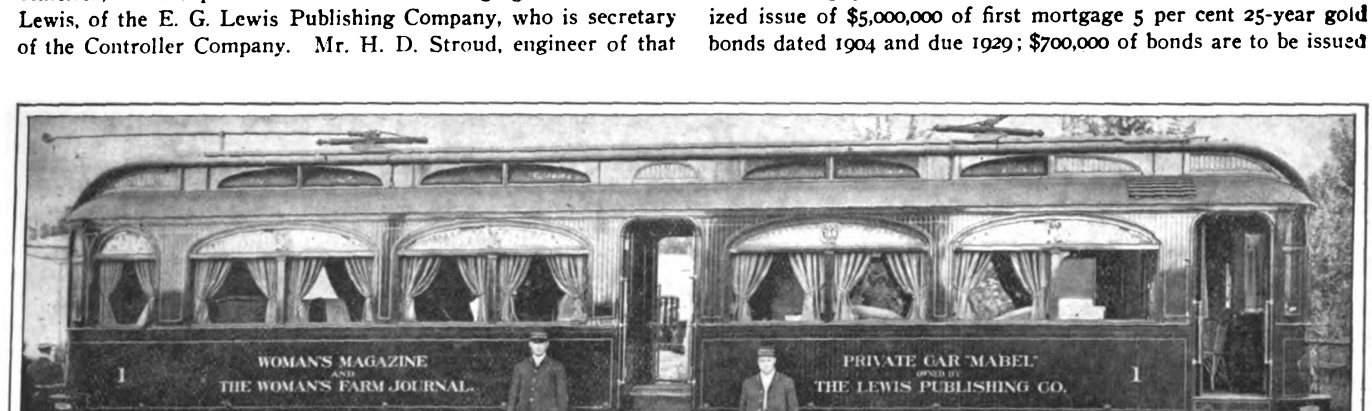
EXTENSIONS OF TOLL SYSTEMS OF KINLOCH L. D. TELEPHONE COMPANY.

THE following official statement has been issued by the Kinloch Long Distance Telephone Company, of St. Louis, Mo.:

This company has completed lines to Terre Haute, and established connection with the Indiana and Kentucky Independent long distance companies to Sedalia and Nevada, Mo., where connection is made with the lines of the Kansas City Independent Telephone Company, and has finished toll lines to Joplin. We have under construction now toll lines to Springfield, Ill., for connection with the Independent telephone companies operating in the northern part of the State of Illinois.

Our mortgage is dated January 1, 1904, and secures an authorized issue of $5,000,000 of first mortgage 5 per cent 25-year gold bonds dated 1904 and due 1929; $700,000 of bonds are to be issued on the present property and $300.000 whenever the company shall expend that sum for actual additions; the remaining $4,000,000 are to be issued from time to time when required by our company in amounts equal to 75 per cent. of the actual cost of permanent additions and improvements, provided the net earnings amount to at least the rate of 10 per cent. per annum on the principal of the bonds outstanding, and also the bonds to be issued at the respective times. The American Trust and Savings Bank, of Chicago, and Geo. W. Galbreath, of St. Louis, are the mortgage trustees.

None of the stock is owned by the Kinloch Telephone Co., nor are our bonds guaranteed by this latter company. Our stockholders, however, are in the main stockholders in the Kinloch Telephone Co. Of the $5,000,000 of authorized share capital, $400,000 has been issued.



Private Car Owned by Mr. E. G. Lewis, of the Controller Company of America.

CUYAHOGA SUES BELL.

THE Cuyahoga Telephone Co., of Cleveland, Ohio, has brought suit in common pleas court against the Cleveland Telephone Co. and Fred S. Avery, proprietor of the Euclid hotel. The hotel was equipped with the Cuyahoga company's telephones, and a few days ago the hotel management contracted to use the service of the Bell company. The latter, it is alleged, cut the wires of the Independent company and connected up its own. The contract is an important one as every room in the hotel is connected, a total of 200 telephones being used. The Cuyahoga company alleges that it went to great expense and is suing for the fulfilment of its contract with the hotel.

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SOME REMARKS ABOUT THE TELEPHONE.

THE AMERICAN TELEPHONE JOURNAL, as the exponent of Independent telephony, of course, believes in the telephone and in the telephone habit—for it is a habit as well as a convenience. We would not for anything say a word against that most wonderful scientific contrivance. The telephone can speak for itself, and needs neither condemnation nor praise. But the fact remains that when it comes to service, in spite of its undeniable usefulness, the telephone, especially the Bell variety, is sometimes a nuisance. We mention this matter, not in a fault-finding spirit, but to emphasize the overshadowing importance of good service.

To be sure, the telephone facilitates business, to which somewhat doubtful blessing we all cry amen, as if business was the chief aim in life. But with the invention of the telephone our modern pandora has let an entirely new set of annoyances out of the box, which chasten the Christian spirit most severely. Undeniably the telephone is useful. But at what cost! Its way is strewn with ruined tempers and profanity. If thoughts, instead of spoken words, could be sent through the telephone, ordinary copper wire would be found entirely inadequate, were it three times as large. To sit down at the desk and hold conversation with some one in a distant city, or even in the next block, fills one with wonder and admiration. To talk into a hole in the wall and receive a more or less intelligent answer is enough to fill the soul with awe, when viewed in calmness and appreciation. But what if the telephone girl cuts us off in the most interesting part of the conversation? Ah, there's the rub, as Shakespeare would have said had he possessed modern advantages. It is all just as wonderful as before, but the spirit chafes at such interruption.

All of which shows what a queer creature the human mind is. A few months ago hours were required and expected as a matter of course for an answer to our question. A few years ago it took days to hear from a friend. We asked our questions and waited with unruffled temper for telegraph or post to bring us reply. Now, response must be instantaneous and uninterrupted, or there is trouble. It is useless to argue with human nature. When a person drops his work to answer the telephone bell and finds that the presence at the other end of the line has gone to sleep or has forgotten that he rang, does human nature stop to ruminate on the wonders of science? No. It promptly gets mad at the telephone girl. The aggrieved individual wants to call her up and tell her so frankly; but he cannot raise "central"; he cannot raise anybody. He sits down and becomes absorbed in his work once more. Then the bell sounds and the telephone girl sweetly inquires if he rang. In this evil manner does the aggravating invention follow him throughout the day, if the service is not all that it should be. These are little things, but it is the little things in life that grind human nature.

WHY GOOD SERVICE IS MOST ESSENTIAL.

He goes back to his toil and tries to forget that there is such a thing as a telephone; then the bell again sounds and a voice inquires if this is sixty-six. No! It is seventy-six! After a little, he asks for his grocer, and "central" gives him the coal dealer, with whom for certain reasons he dislikes to hold a conversation. He tries to get him off the wire and can't. He tries again. He jerks the instrument nearly out of place in vain attempt to get central. Each succeeding struggle brings the other fellow to the machine, until human nature can endure no more. Both he and the coal man gaze at the ceiling and heap dreadful maledictions on the innocent head of the telephone girl.

And so it continues until the tired victim of the telephone habit goes home at night to dream of telephone girls and the coal man.

Many and many a time in some small exchange, after wrestling with the telephone for hours until the burden became greater than he could bear, has the exasperated subscriber sought out the mysterious "central," going up the stairs two steps at a time, determined to cast the burden with great force at the feet of the telephone girl. But how the courage oozes when one stands face to face with a womanly presence! One can talk to a girl through miles of copper and express his mind freely. It is different at close range. Besides five minutes in a busy operating room will convince the most unreasoning that the telephone girl is more sinned against than sinning. Naturally, human nature is the same inside of a telephone room as outside, and no doubt occasionally an employee is found who is not courteous and vigilant, but it is safe to say that the telephone operators have more to try their temper and come in contact with a more varied assortment of human nature in the course of an hour than most people do in a week.

It is hardly necessary to more than allude to this question of service when Independent companies are concerned. From necessity, almost from the force of circumstances, Independents have been forced to lay unusual emphasis upon good service. In no other way have they been able to so successfully invade the field of the Bell monopoly. If for no other reason, the patrons of the many telephone companies owe a debt of gratitude to Independent telephony, for, by making good service its watchword, it has in many instances aroused its great rival out of its apathy and characteristic disregard for the rights and needs of the people.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

UNLAWFUL DISCRIMINATION

THE Southwestern Telegraph & Telephone Co. was sued by D. L. Phillips in the Circuit Court of Pulaski County, Ark., for unlawfully discriminating against him and refusing to supply him with telephone connection at his residence. Complainant sought to recover a penalty under the statutes of Arkansas, of $100 for each and every day that elapsed between his first demand and his last, the plaintiff alleging that he made a demand for connection continuously from day to day from July, 1899, until the middle of February, 1900. The defendant demurred on the grounds that the plaintiff did not state facts sufficient to contsitute a cause of action. The demurrer was sustained and the case carried to the Supreme Court.

Said the Court, "The plaintiff does not allege that he was discriminated against. Had he done so without stating facts constituting the discrimination, it would have amounted only to a conclusion of law, but he merely alleges that the defendant had refused and failed to supply him at his residence with telephone connection and facilities after repeated application by him therefor. Then he says, 'that by reason of the aforesaid discrimination and refusal, defendant has incurred a penalty under the provisions of the statute.' This does not amount to a statement of facts constituting discrimination. It is only a statement of facts constituting a refusal to furnish telephone connection and facilities, and we do not understand that this is actionable." The Court therefore sustained the judgment of the inferior Court in dismissing the complainant. Phillips vs. S. W. Telegraph & Telephone Co. (Ark.), 81 S. W., 605.

TELEPHONE LINES NOT AN ADDITIONAL SERVITUDE.

THE Supreme Court of Kansas has arrayed itself by a divided court with those States that hold the construction and maintenance of a telephone line upon a rural highway is not an additional servitude for which compensation must be made to the owner of the way over which the highway exists. In constructing a telephone line the Johnson County Telephone Company was proceeding to plant poles in a highway in front of the farm of Michael McCann. The poles were placed near the hedge fence on the line dividing the farm from the highway, and were so located as to interfere with the trimming of the hedge and also with the cutting of the grass and weeds on the roadside. He sued for an injunction, alleging that the company had not obtained his consent to plant telephone poles on the highway opposite his farm, that his interest as the owner of the fee had not been conveyed, condemned, or otherwise appropriated, and that no compensation had been paid to him for the proposed use.

In Kansas the adjoining owner of land owns the fee in a rural highway and retains the ownership of the land for all purposes not incompatible with its use as a public highway. The highway was established for the use of the public, and "the telephone line," the court held, is not only a public convenience, but is a recognized public use." "The question," said the court, "is, whether it is a contemplated and appropriate use of a highway, or a use outside the scope of a rural highway, and therefore, an additonal burden?" "The use of the highway," said the court, "has been variously defined to be for passage, travel, traffic, transportation, transmission and communication." The use is not to be measured by the means employed by our ancestors, nor by the conditions which existed when highways were first defined. The design of a highway is broad and elastic enough to include the newest and best facilities for travel and communication which the genius of man can invent and supply. In a certain sense, the telephone is an adjunct of the highway as a telegraph is of the railway. The messages transmitted over the line are a substitute for the messengers who formerly passed over the highway, and thus, to a great extent, relieved it from the burden and wear of travel. The court further held that the telephone was within the purpose contemplated when the highway was established, and refused the injunction asked for.

One of the justices expressed the opinion that the injuries complained of by the plaintiff were trivial. He said: "I am not in favor of opening the courts to injunction suits which are purely obstructive, which are brought merely for the vindication of a theory, and which have for their basis nothing more than an intangible interest in land which suffers nothing but an imaginary injury." Justice Johnson dissented from the views of the court, being of the opinion that a telephone *was* an additional servitude upon the highway. McCann vs. Johnson County Tel. Co., 76 Pac., 870.

COMPANY SUES TO PROTECT ITS EMPLOYEES.

THE Federal Telephone Company of Monongahela, Pa., has filed a bill of complaint asking that the Pittsburg & Charleroi Street Railway Company be compelled to raise its lines so that the lives of workmen may not be in jeopardy and the operation of its system may not be hindered. To support the statement that lives of men are in danger while working on the poles of the Federal Company, the bill mentions the electrocution of one of their employees last April, an accident which is claimed to have been caused by the proximity of the two lines, and not by contributory negligence. Over a portion of the distance from Black Diamond to River View the two lines run parallel, and it is the endeavor of the telephone company to have the street car company remove the high-tension lines to a safer place than at present. The bill asks that "the defendant be required to reconstruct said lines at points of interference as set forth in such a manner that danger and interference may be removed."

The street railway company in answer, claims that the high-tension lines carrying 15,000 volts are absolutely necessary to operate the road and that they were placed in position with full knowledge of the plaintiff company as to the voltage carried. The defendant company also alleges that at an extraordinary expense it obtained the tallest poles possible. The defendant avers that the death of the empolyee mentioned was caused by his own contributory negligence. The defendant avers that they are willing to make any concessions that are reasonable and proper, but consider it the duty of the plaintiff to move its lines.

COMPANY IN DEFAULT.

THE Missouri and Kansas Telephone Company will not be permitted to erect poles in the streets of Kansas City until it complies with the ordinance levying a tax on its poles and wires. The company has many applications on file for permits to erect poles and extend its wires. When these were brought up for action at a former meeting of the board of public works the subject was referred to the city counsellor to ascertain whether the company was complying with the city ordinance in the matter of erecting poles. The counsellor replied that the company was in default on its pole and wire tax.

The ordinance with which the company has failed to comply levies a tax of $1 a pole, twenty-five cents a mile on open wire and fifty cents a mile on wires inclosed in cables. The company contends that as it pays a tax of thirty cents a lineal yard on its conduits it should be exempt from tax on its poles and overhead wires. The city holds that the poles and the wires outside of the underground districts are subject to a tax.

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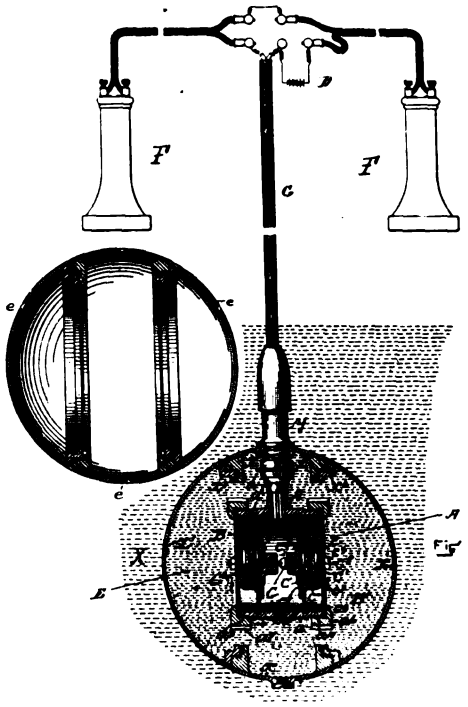
TELEPHONE PATENTS

SUBMARINE TELEPHONIC APPARATUS.

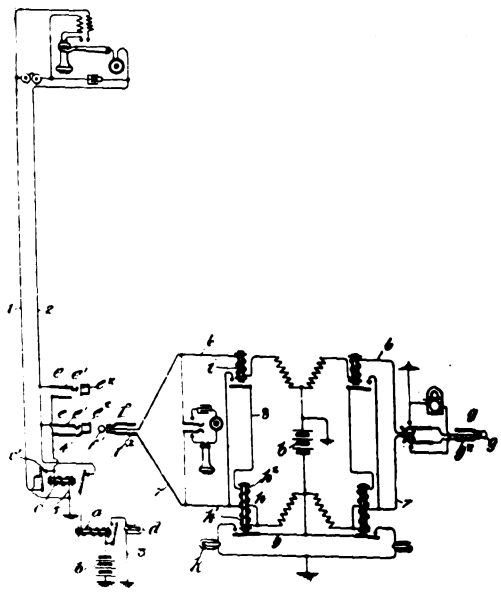
A. J. Mundy, of Boston, Mass., is granted patents (Nos. 768,568, 768,569, 768,570, 767,571, 768,572, 768,573 and 768,567) and assigns to the Submarine Signal Company, of Waterville, Me. The object of these patents relate to telephonic apparatus which is arranged to be submerged in water and to be used as detectors of sound waves which may be transmitted through the water. The essential features of the invention, which is protected by all of the patents, are shown in the accompanying illustrations, from which it will be perceived that the inventor provides a watertight cylindrical case, which is filled with a fluid capable of transmitting the sound waves which impinge upon its exterior to a microphone which is located in the center of the case. The micro-



phone consists of a fluid-tight box containing two diaphragms, as is shown, to which the microphonic buttons are attached, these microphonic buttons being connected with a pair of receivers through a waterproof cable. The theory of the invention lies upon the assumption that a sound wave traveling through the water will impinge upon the case, and will be taken up thereby and transmitted by the fluid to the diaphragms B and B', which will actuate the microphones attached to them and cause these sound waves to be repeated in the receivers, which may be located at any convenient place. The various patents cover the application of this device to ships, buoys and other similar cases where it is desirable to detect sound waves, which are transmitted through the ocean or long distances.

COMMON BATTERY CIRCUIT.

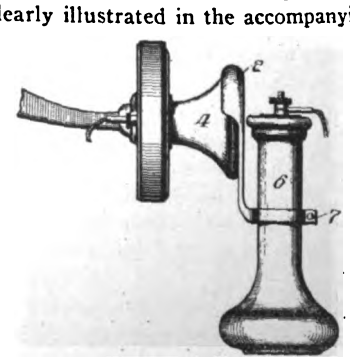
J. L. McQuarrie, of Chicago, Ill., patents (No. 768,617) and assigns to the Western Electric Company, of Chicago, a common battery circuit. The intention of this invention is to provide a two-wire circut which is adapted to common battery requirements, as is shown in the accompanying illustration. The operation of the system is as follows: When the subscriber removes the receiver, the line relay *a* is excited, closes the local circuit *3* and illumines the signal lamp *d*. The operator inserts the plug *f* into the answering jack. This completes circuit from the free pole of the grounded battery *b* through the strand *7* .contacts *f2* of the plug *f*, thimble *c2* of the spring jack *c*, conductors *4 5* of the cut-off relay *c* to the ground. The cut-off relay is excited and attracts its armature, extinguishing the line signal. The front contact *c'* of the cut-off relay is closed, completing circuit from line wire *1* to the free pole of battery *b*. A complete metallic circuit is now formed from the positive pole of battery *b* through strand *6*, tip *f'* of plug *f*, linespring *e'* of jack *e* to line wire *2* through the substation apparatus and back over conductor *1*, contact *c'* of cut-off relay *c*, conductor *4*, thimble *c2* of spring jack *c*, ring *f2* of plug *f*, con-



ductor *7* to the negative pole of battery *b*. As relay *i* is included in this circuit it is energized, closing branch *8*, including winding *h2* of relay *h*. The branch *5* forms the return path from conductor *7*, independent of the hookswitch, so that a local circuit is provided through winding *h'* of relay *h* so long as the cord is in use. Both windings *h'* and *h2* of relay *h* are now in the battery circuit, but these windings neutralize each other and the supervisory signal is not illumined. When the receiver is replaced the circuit through the winding of relay *i* is broken, opening branch *8* containing winding *h2*, then relay *h* becomes excited; its armature completes local circuit *9* and the supervisory signal *k* is illumined.

RECEIVER SUSPENSION.

W. Stanley Haddock, of Uniontown, Pa., patents (No. 769,863) an improved receiver suspension. This invention is intended to provide a new and novel method of suspending telephone receivers and is clearly illustrated in the accompanying figure, from



which it appears that the receiver is provided with a kind of hook clamp *7*, which is attached to the stem of the receiver, having its upper extremity so formed as to provide a hook which may be hung upon the mouthpiece of the transmitter.

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THE TELEPHONE PATENT SITUATION

By Edward E. Clement.

THE subject of patents has probably been as closely considered by telephone men in the United States as any subject, even engineering practice bearing on their chosen work—and this for a very good reason. They have been forced to consider it or stay out of business. When the telephone was born, as usual there were several claimants for the honor of fraternity, and when the Supreme Court, by anything but a unanimous vote, confirmed the claim of Bell, it gave additional impetus to a fight that has raged ever since, and which bids fair to continue as long as men need to annihilate distance and use wires instead of legs. So when a man has come into the telephone business, he has needed some money, more sense, and a lot of nerve, together with a good knowledge of the patent situation or a competent adviser—and a man has had to be a fighter to succeed.

The reason some of the early manufacturers got their start so well was that in 1894 and 1895 the people at large were like a lot of sheep waiting to see which way they scented the wolf, and watching the dogs who wanted to lead them half in admiration and half in distrust. These men got a reputation as fighters and I occasionally get letters yet from back country districts up Northeast or out in the West recalling the fears and shakes of the old days ten years ago.

These very words, "old days," when we consider the brevity of the real time that has elapsed, tell a story. A giant has grown from a puny infant in that brief period; all the thirty or more suits brought by the Bell Company, and the thousands of patent claims outstanding, have proved only "Packthreads on Gulliver," powerless to hold him down. And the full promise of the giant's youth is not yet realized. All civilization rests on two factors—transportation and communication. The time will come when the electric telephone and the electric railway will encompass and cover this broad land, if not the world from ocean to ocean, and the telephone at least will cross the oceans. The present occasion furnishes a convenient opportunity to look backward as well as forward, to review past achievements, and to forecast from these what the future may hold.

We are met here for one purpose which all present, I believe, hope earnestly may be accomplished. I refer to the formation of a strong, representative and truly national association, which shall not only serve to unite and harmonize the operations of the various State organizations, but shall furnish an offensive and defensive alliance in the best and fullest sense. The necessity for such a body is strongly apparent, and its effect, not only in strengthening the market for telephone securities and insuring protection from patent persecution in the courts, but in adding to the facility and ease of transaction of business, cannot be overestimated. With regard to patents it is far too soon to consider the field as open. On the contrary, in this case, as in every other, eternal vigilance is the price of liberty. The old association has done excellent work in defending the suits brought under the Berliner and other patents, but its future work, if properly carried out, will be even more important.

Day by day more patents are being issued, month by month the Bell interests and Independents alike are acquiring new leases of monopoly on the application of principles which in the near future will become essential to the operation of high grade systems. The patent office is issuing an average of over thirty patents a month, and whereas a few years ago two examiners could handle the class of telephony, it now takes four, with the assistance of a fifth, and they are overworked. Few people have any adequate conception of what the patent situation has meant in work and money expended. I will give you a few figures to illustrate.

There have been issued 4,298 telephone patents, of which 3,798 are in the class of telephony proper, and 500 are scattered. I do not include in this number all the patents for electric lighting, power generation and distribution which have a bearing on telephone system as installed, but I should say there are probably 500 more of these.

The modern telephone plant is not essentially telephonic. It comprises really a power generating and distributing system, with auxiliary telegraph system, whereby the supply of power is controlled. The only thing telephonic about it are the transmitters and receivers at subscribers' stations and the central office.

Of the 3,798 strictly telephonic patents, that is, those so exhibited and classified, 3,798 are for receivers, 683 are for transmitters, of which 216 relate to the granular type, 469 relate to exchange systems and 715 to switchboards, of which 465 cover multiple boards exclusively, and the rest single or transfer boards. About 75 of the system patents also relate to multiple boards, and nearly 300 cover circuits which are applicable thereto. Ninety-five are to exclusively transfer systems, so the preponderance of choice in the favor of the multiple board is thoroughly apparent. Of intercommunicating or house systems there are 57 patented, and of party line systems 577. Of the latter, 200 employ step by step selective mechanism, and I believe there are two things every man who has an idle hour tries his hand at. They are car couplings and step by step telephone selectors. Both classes absolutely overworked.

There are 160 patents for transmitter arms and receiver supports, and 211 switch hooks. Last, but by no means least in importance at the present time, there are 125 patents for automatic exchange systems and apparatus. The actual number of automatic patents is small, but I assure you they must be measured by *weight* to be appreciated. No living man knows all the details of all the apparatus in those 125 patents, and no man ever will, not even the inventors themselves. Some of the devices are fearfully and wonderfully made, and some are distinctly abortions.

In these patents I estimate there are altogether 48,038 claims, each, of course, standing as a distinct patent for what it covers.

The patents have cost:

Government fees	$150,430
Attorney fees and expenses	200,000
Interferences	300,000
A total of	$650,430

This is what the patents themselves cost. It does not touch the value of the inventions, nor the amount at which they may have been capitalized, which has, of course, run into many millions. Nor does it touch the cost of litigation, past and present. For all this the people at large have to pay sooner or later. The manufacturer or operator is only a middle man, who collects on the one hand and distributes on the other. Out of the total number given, about 1,800 or 2,000 are owned or controlled by the Western Electric Company and the American Telephone & Telegraph Company (Bell).

Assuming that 20 per cent. of the patents in the class of telephony have expired, and that 30 per cent. are invalid or worthless, there remain 24,000 in force, many of which probably need serious consideration. A respectable percentage of these 24,000 belong to Independent companies or individuals, but I wish to point out that without more than a friendly understanding (which binds nobody), this is no guarantee that suits will not be brought on them. If the Independent companies, both operating and manufacturing, stand together, the Bell interests can never again do them serious damage by patent suits; and the growth of public sentiment in favor of Independent investments will be sure, though slow; but if any amount of litigation develops among the Independents themselves, it will be the very worst thing that could happen, and must have a very depressing effect. The weakness of a house divided against itself is proverbial, and so surely as the larger Independent companies are gathering the elements of

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monopoly into their hands, so surely will division come. I know that men do not spend money in development and patents out of charity, nor do I mean to depreciate the full protection of every man's property; but surely there must be some division line between those things that are essential and those that are not. There are many patents on transmitters—683 in all—and the transmitter is a common necessity. Of the 216 granular instruments patented, probably 100 belong to Independent owners, and more are coming as fast as patent attorneys can hatch up new excuses for them.

There are 327 magneto receiver patents, of which probably 75 are modern and in Independent hands. Suits on such patents as these, where they cover only difference in details, should be discouraged. Of course, no one can be absolutely deprived of his right to go into court, but a strong restraining hand could tend to avoid scandals.

My suggestion upon this point would be that a national arbitration board be appointed, and that it be made absolutely obligatory upon all members of the association or its component State associations, as well as upon those non-members with whom they deal as purchasers, that they submit all disputes or questions of infringement to this board *before* going into court.

They need not disclose their proofs necessarily—but if a charge of infringement be made, the board should have an opportunity of passing upon the prima facies, so that if upon the face of things the complainant had not a righteous cause, he would go on with the official stigma attached to him stamped *Disapproved.* This board, of course, would have to be made up of disinterested men of sufficient standing and technical knowledge to give their decisions weight. I believe such an arrangement would tend to discourage litigations over trifles, and in my belief large causes of dispute are few and far between.

The manufacturers have shown a meritorious desire to avoid infringement of any patents, and some of them have spent large sums in securing competent advice to this end. This is money exceedingly well spent. Another method of achieving the same result would be to form a pool to hold all non-essential patents, with a scale of reciprocal royalties, so that any one in the pool could be free of the patents held for a reasonable sum per annum, which would be divided among the members in proportion to the pro rata royalties paid on claims they put in. This, however, is for the manufacturers to settle, although the operators are the parties most interested.

With regard to important suits of the past, or likely to be brought, especially by the Bell, in the future, the broadest patents are all expired, and the most threatening ones are out of business, temporarily or permanently. The Firman multiple board patent, the Haskins and Wilson busy test patent, the Seeley answering jack patent, and the Bell common battery patent are all gone forever, while Berliner is on the shelf along with the narrow subject matter to which he was restricted and which no one wants to use.

The Scribner patent, 330,061 (expired), was sustained against the switchboard, put in use at Mobile, Ala., but resulted in no other damage to the interests of the Independent telephone business. The Carty patent for the arrangement of bridging bells in party line work was sustained in the Millheim case, but was reversed in the Anthracite case and is now awaiting final decision by the Court of Appeals.

The suits brought by the Western Electric Company against the Citizens' Telephone Company, of Grand Rapids, Mich., on the Eldred patent, 303,714 (106 F. R. 215), and the Watson patent, 266,806 (89 F. R. 670), and against the Western Telephone Construction Company on patents 215,833 to Rosevelt (79 F. R.) and 270,522 to Watson (81 F. R. 572), and against the Williams Abbott Electric Company on the Gray patent 309,617 (108 F. R. 952), all resulted in defeat for the patents sued on and established the right of the public to use the various switching and switchboard devices alleged to have been covered by them.

More recently Judge Wing decided against the Western Electric Company on suits brought by it against one of the Independent manufacturing companies for the alleged infringement of four of its patents (357,358, 477,616, 488,033 and 552,729), involving the construction of spring jacks and annunciators, while suits on the five common battery patents to Bell 346,708 (expired), Stone 507,568, Scribner 559,616, Kitsee 430,960, and Hayes 474,323, brought by the American Bell Telephone Company against certain Independent operating companies, and suits brought by the Western Electric Company on patents 575,653, 488,938, 431,531 and 11,929 (reissue) against other Independent telephone companies have been indefinitely suspended awaiting the decision of the court in the alleged illegal purchase of the Kellogg Switchboard & Supply Company by the Bell interests. Numerous other patent suits have been brought and subsequently abandoned by the Bell interests, while suits on a number of patents, including 427,629, 669,708 and 667,463, in addition to those above mentioned, which have been indefinitely suspended, have not as yet received action from the courts.

Another decision has been rendered in Rochester within the past few days on a Bell patent, which will be welcomed generally. I refer to the Scribner patent 559,411, covering the control of supervisory lamp in the third conductor in the cord. The patent is declared invalid, I am informed, and this opens one more door which is of some importance.

On the whole, I can see no reason to fear successful attack along any important line from the Bell Company. I do not mean by this that there will be no suits, but they will be brought for effect only, and the effect can be discounted, if not entirely destroyed, by a united and harmonious stand. With the same amount of reasonable precaution and the same investigation that an investor in any other field would feel bound to make, every assurance can be given that success will continue to crown our banners in the future as it has in the past.

Independent telephone securities are absolutely safe, so far as patent suits now being prosecuted or to be brought in the future by the Bell people may go. All that is needed to create confidence is union, and I trust in closing I may be permitted to express my earnest hope, as one who has been with this movement since its birth, that its end will be more glorious than its beginning or in Oriental phrase, "May the end of this house be *Peace.*"

EDITOR'S NOTE.—Paper read before the Convention of the National Independent Telephone Association of America at St. Louis.

INDEPENDENT SYSTEM FOR CHICAGO SCHOOLS.

AN independent telephone system is to be established by the Board of Education of Chicago. It will connect all the public schools with the offices of the school board in *The Tribune* building. The object is to facilitate school work.

A subcommittee of the buildings and grounds committee, composed of Chairman O. A. Thorp, President Clayton Mark, and Trustee George J. Thompson will meet this afternoon to complete the plans. The cost of installing the service is estimated at $30,000, but the trustees believe it will be more economical to meet this initial expense and the cost of maintenance than to pay rentals to the Chicago Telephone Company for similar equipment. The manner in which the system is to be installed has not yet been determined upon.

The subcommittee has had the plan of establishing the Independent telephone system under consideration for more than a year.

ALASKA CABLE FINISHED.

THE last link in the government cable from Sitka, Alaska, and Seattle, Wash., was completed recently, when the cable steamer *Burnside* entered the Straits of Fuca and picked up the shore end for the final splice. This cable is solely for telegraphic purposes and was built by the United States Government to give a direct route without crossing foreign territory. It connects with Sitka, Skagway and Juneau, and will probably be extended to Dutch Harbor and Kiska Island, when a naval station has been established.

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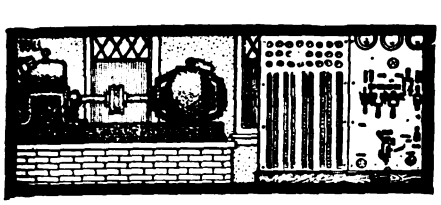

QUERIES

Questions on any subject relating to telephony will be answered on this page.

CROSS TALK AND TRANSPOSITIONS.—(429.)

Will you kindly inform me whether it is possible to transpose a metallic circuit so that there will be no cross talk or to reduce it to such an extent that it will be practical to use when run on same pole line for six miles with a grounded telephone circuit? If so, will you please state the best method of transposition for three grounded lines and one metallic circuit on a ten-pin cross arm for six miles? If it is possible to get rid of the cross talk on the metallic circuit, we could get along with the grounded lines. A. C. A.

Cross talk may arise from one or all of three causes. It may be due to electrostatic induction, to electromagnetic induction or to leakage. If the cross talk which you speak of is due to either or both of the first two causes, a sufficient number of transpositions will usually obviate the trouble, but if the cross talk be due to leakage, the best remedy is to improve the insulation of the several lines. We would suggest that you try the experiment of transposing your metallic lines in accordance with the accompanying diagrams. If you find that this is satisfactory, no further steps need to be taken. If after you make the transpositions the cross talk is decreased, but not sufficiently eliminated, it is probable that still further improvement can be secured by increasing the number of transpositions, say by doubling them. Whereas, if the experiment of transposing does not make a marked improvement, it is probable that the cross talk is due to leakage and it will then be necessary to improve the insulation of your lines.

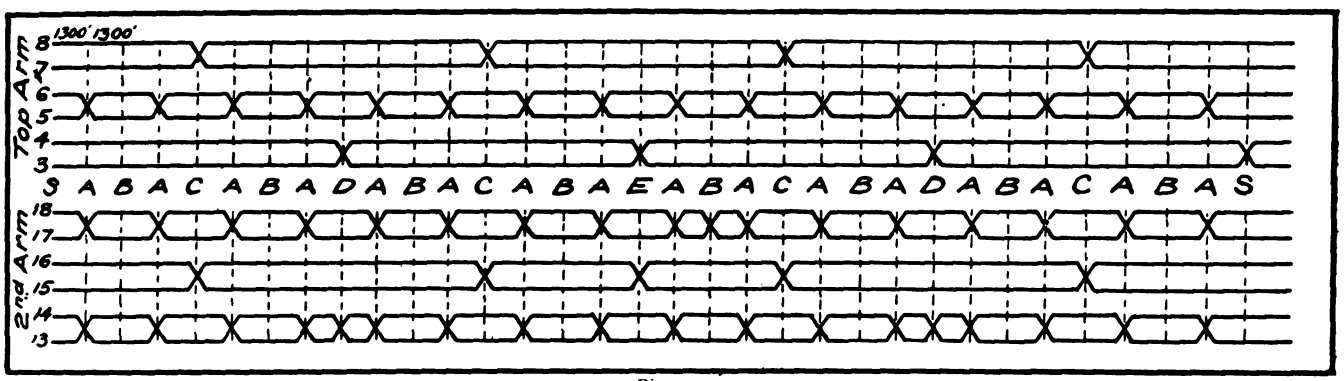

Fig. 429a.

BELLS AND CONDENSERS.—(430.)

We are considering changing over our system from magneto to common battery. At present we are using 1,000-ohm ringers; could they be used in the common battery instruments, and if so, what size condensers would have to be used? Could we use the old transmitters? L. Tel. Co.

We think it would be better to buy the common battery instrument complete, otherwise the telephones will be patched up and at best you will not save enough to warrant keeping the old ringers. If you have party lines of any size the ringers should have at least a resistance of 1,600 ohms. A 2 m. f. (micro-farad) condenser is the standard type used and will answer your purpose. The transmitters you have are of low resistance and intended only for local battery work. They would not operate successfully with common battery, and on this account it would be necessary to get common battery transmitters which are of much higher resistance.

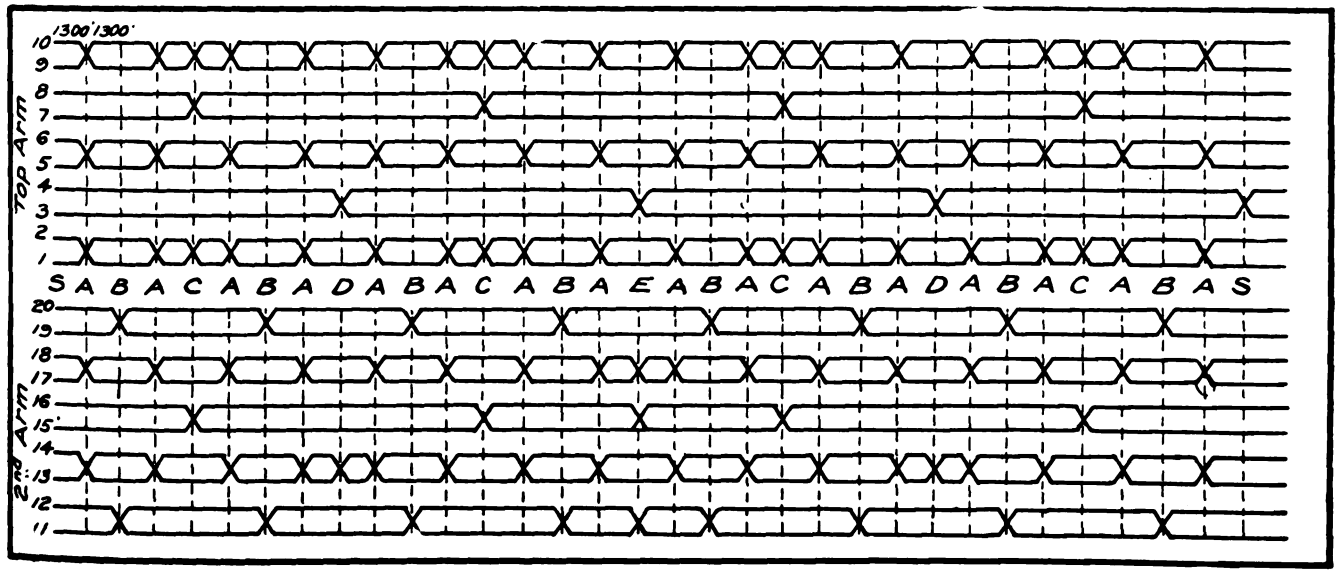

Fig. 429b.

CROSS TALK.—(431.)

We have bridging grounded lines and from 4 to 8 lines on a cross arm. The cross talk is bad. What is the best method of transposition to eliminate this trouble? G. C.

It is impossible to transpose grounded lines. The only way for you to overcome the difficulty with satisfaction is to make the lines metallic and then properly transpose them.

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THE WEEK'S MESSAGES

FINANCIAL.

JEFFERSON CITY, MO.—The Kinloch Long Distance Telephone Company, of St. Louis, has increased its capital stock from $2,000,000 to $3,000,000 and will use the new capital to extend its lines.

ROUND LAKE, N. Y.—At a meeting of the Clifton Park Telephone Company a dividend of 8 per cent. was declared.

CLEVELAND, OHIO.—It is reported that the Cuyahoga Telephone Company will pay a dividend on its common stock after the first of January.

COLUMBUS, O.—The Citizens' Telephone Company, of Columbus, is now selling $300,000 of preferred 6 per cent. stock, the proceeds of which will be used for enlarging the capacity of the plant to 8,000 main line telephones and an ultimate capacity of 19,000 telephones.

PLATTSBURG, O.—The Plattsburg Home Telephone Company has increased its capital stock from $10,000 to $20,000.

ERIE, PA.—The Union Telephone & Telegraph Company will be reorganized with $500,000 capital, and the lines extended. About $30,000 worth of new copper has been added, and connections will be made with all principal cities.

SUSQUEHANNA, PA.—At the last meeting of the directors of the Centermoreland Telephone Company, held at Tunkhannock a few days ago, it was agreed to increase the capital stock of the company to $50,000. This increase is made necessary on account of the consolidation of this line and the Northern Tier and Factoryville companies. The business has grown to a business where several hundred miles of wire, four exchanges and over 300 telephones are required, in a little over two years.

LONE OAK, TEX.—The Citizens' Telephone Company, of Lone Oak, has increased its capital stock from $4,000 to $8,000.

FRANCHISES.

OCEAN PARK, CAL.—The trustees have granted a franchise to the Home Telephone Company to construct and operate a system here.

SONOMA, CAL.—L. Breitenbach has secured a franchise from the trustees of Sonoma for a telephone system.

BRANTFORD, ONT., CAN.—F. Dagger, representing the Starke Telephone & Electric Light Company, was here recently arranging the claims of his company for a local franchise.

COLORADO SPRINGS, COLO.—M. H. Spere will ask the City Council for a franchise.

CORDELLE, GA.—The Farmers' & Business Men's Telephone Company has been granted a franchise to do business here. J. C. Ledbetter is at the head of the company.

DODGE CITY, KAS.—An Independent telephone franchise has been granted to L. J. Pettijohn and others, as the city claims the present company is not living up to its contract.

YONKERS, N. Y.—The common council of this city extend an invitation to the State Line Telephone Company to apply for a franchise in the city of Yonkers, provided the company would agree to give better service and at more reasonable rates than is now being given by the Bell Company. The company has replied that it would be pleased to meet the members of the City Council to agree upon terms.

BELLAIRE, O.—The Ohio Valley Telephone Company has obtained a franchise to erect a system. Work will begin at once. Both overhead and underground wires will be used.

CLEVELAND, O.—Homer Hood, of Toledo, has asked the City Council for a franchise for the construction of an Independent telephone exchange.

TIPPECANOE CITY, O.—F. G. Davis, in behalf of the Home Telephone Company, of Troy, has asked the City Cuncil for a franchise to operate in this city.

PHILADELPHIA, PA.—The People's Rural Telephone Company has been granted a franchise through Glassboro Township, Gloucester County.

FAIRFAX, OKLA.—The Fairfax Telephone Company, which has just been incorporated with a capital stock of $10,000, has secured a franchise for an exchange at this point and will begin construction very soon.

WALHALLA, S. C.—George L. Wilson, general manager of the Oconee Telephone Company, of this place, has been granted a twenty-year franchise for a telephone system at Poll City, Ala. He will commence construction October 1st on a thoroughly up-to-date metallic circuit exchange. He has fifty subscribers in sight with rates at $2 and $3 per month for residences and business, respectively. He is in the market and desires quotations on all material necessary for the construction of this system.

PELL CITY, TENN.—George. L. Wilson has been granted a franchise and within a short time the line will be under construction. It will connect Pell City, Eastonville and Coal City.

NEW COMPANY NOTES.

MONTGOMERY, ALA.—The Enterprise Telephone Company has been incorporated with a capital of $15,000.

PETALUMA, CAL.—The Vallejo Township Telephone Company has been incrporated with a capital stock of $5,000 by J. Caltoft, W. Evart, G. W. Ormsby and others.

ASSUMPTION, ILL.—The Assumption Mutual Telephone Company has been incorporated with a capital stock of $5,000 by Allen Peabody, Seth Benepe and James A. Lambdin.

CHICAGO, ILL.—The Rogers Telephone Company, of Chicago, has been incorporated with a capital stock of $100,000 by G. L. Lavery, A. G. Welch and F. H. Sellers.

LAGRANGE, IND.—The People's Mutual Telephone Association, of Lagrange county, has been incorporated with a capital stock of $10,000. The incorporators are John W. Evans, H. D. Portner, M. C. Miller.

UNIONVILLE, IND.—The Unionville Telephone Company has been incorporated with a capital stock of $3,000 to construct and operate a local telephone system. The incorporators are George W. Welch, W. J. Slater, Milford Young, B. J. Linicomb.

LARRABEE, IOWA.—The Spring Cedar Mutual Telephone Company, with principal place of business at Grundy School House No. 6, Cedar township, Cherokee county, Iowa, postoffice address Larrabee, has been incorporated with a capital stock of $3,000. The officers are Richard Gilbert, president; H. I. Weaver, vice-president; A. D. Castor, secretary, and H. W. Braasch, treasurer.

WEST UNION, IA.—The Rogers Telephone Company has been organized here.

VIELE, IOWA.—The Viele Independent Telephone Company has been incorporated with a capital stock of $3,000. The officers are H. A. Skyles, president; Fred Auwaerter, vice-president; R. C. Coulee, secretary-treasurer; B. F. Drollinger, Louis Coulee and William Kudebeh, directors.

EL PASO, KAS.—The El Paso Telephone Company has been incorporated with a capital stock of $500.

GREENFIELD, KAS.—The Gove County Telephone Company has been incorporated here with a capital stock of $5,000.

NORTH BRANCH, KAS.—The Farmers' Mutual Telephone Company has been incorporated here with a capital stock of $4,400 to construct a rural line out of this city.

SPRING CREEK, KAS.—The Spring Creek Mutual Telephone Company has been incorporated with a capital stock of $5,000 to construct rural lines.

ORIOLE, MD.—The Manokin Telephone Company of Somerset County, with headquarters at Oriole, has been incorporated with a capital stock of $5,000 by Dr. R. J. Hoyt, Albert B. Fitzgerald, Isaac G. Parks, William L. Muir, George B. Dozman and Josiah P. Muir.

ZUMBRO FALLS, MINN.—The Zumbro Falls Farmers' Telephone Company has been incorporated with a capital stock of $7,000 by Frank Robinson, Bert W. Disney, Charles Anding, Albert Sugg, Albert Robertson, John C. Brinkman, James Ross and Jacob J. Springer.

BROWNING, MO.—The Browning Telephone Company has been incorporated with a capital stock of $1,070 by S. L. Gibson, F. M. Haymaker, M. R. Jenkins, J. J. Smith, E. B. Fields and others.

FAIRFAX, MO.—The Fairfax Telephone Company has been incorporated with a capital stock of $10,000 by J. A. Holt, M. C. Holt Eby and others.

LAMONTE, MO.—The Lamonte Telephone Company has been organized with a capital stock of $10,000 by J. A. Holt, M. C. Holt, Eby and others. president; J. A. Fleming, secretary; John McCurdy, treasurer.

ADAMS, NEB.—Adams is to have a telephone line in operation soon. F. B. Dasper is president and W. C. Gray secretary-treasurer.

JERSEY CITY, N. J.—The Dixon Home Telephone Company, with headquarters at 245 Washington street, Jersey City, has been incorporated with a capital stock of $125,000.

MADRID, N. Y.—The Madrid Telephone Company has been incorporated with a capital stock of $10,000 by E. M. Akins, Lisbon, N. Y.; G. P. Hosford and F. T. Rutherford, of Madrid, N. Y.

NEW YORK CITY, N. Y.—The Pinar del Rio Railway & Iron Company, of New York City, has been incorporated under the laws of Delaware with a capital stock of $1,000,000 of constructing telephone and telegraph lines and other purposes. The incorporators are Joseph Bailey, of Patchogue, L. I., N. Y.; Leonard L. Bishop, of West Hampden, N. Y.; Fred D. Gillin, of Chicago, and Louis G. Cone, of Havana, Cuba.

SMITHBORO, N. Y.—The Ross Hill-Smithboro Telephone Company has been organized at a meeting held in Ross Hill recently. The following officers were elected: Charles Carpenter, president; E. E. Bailey, vice-president; E. A. Hussong, secretary, and Charles Bedell, treasurer.

CLEVELAND, O.—The Telagirl System Company has been incorporated with a capital of $25,000 to operate an exchange for public and private stenography. Edwin C. Riegel, Oscar P. Riegel, Henry Wilker, Rud. C. Frey and M. E. Meisel are the incorporators.

DEFIANCE, O.—Highland township will have a Farmers' Telephone Association of its own. A company has been organized with twenty-two subscribers to start with and will have connection with twenty-eight switchboards of various farmers' associations. The company will make an effort to get its line into Defiance. The exchange of the new company will be located at Ayersville. The officers are: President, Henry Greenler; vice-president, John Baum; secretary, Will Stone; treasurer, John Stork. The above officers with David Hill, J. M. Myers and J. J. Thieroff compose the board of directors.

ELMIRA, ORE.—The Eugene, Elmira & Florence Telephone Company has been incorporated with a capital of $1,000 by J. L. Inman, F. C. Walters and others.

OPP, PA.—The Muncy Creek Telephone Company has been organized with the following officers: T. W. Raper, of Bardsville, president; W. S. Opp, of Opp, secretary, and P. W. Opp, of Opp, treasurer.

WILLIAMSPORT, PA.—The Buffalo Valley Telephone Company has been organized with a capital stock of $10,000. Hon. H. M. McClure, Hon. G. C. Mohn, Capt. William R. Follmer, Dr. James Kleckner, John P. Ruhl, Charles R. Ruhl and William Dreisbach, board of directors.

BATESBURG, S. C.—The Batesburg Telephone Company has been incorporated with a capital stock of $500 by William Westmoreland, of Samaria, president; Elijah Hall, vice-president; Dr. J. A. Watson, secretary and treasurer; E. F. Struther, attorney, and John Bell Towill, William Westmoreland, E. R. Steedman, J. F. Kneece and Wilson Gunter, directors. The company will construct a line from Batesburg to Steadman.

WALTERBORO, S. C.—The Colleton County Telephone Company has been incorporated by Dr. T. B. Whatley, W. T. Gray and C. C. Tracy. Work has already been begun on the local system, with connections to Centerville and Cottageville. It is the purpose of the company to give every part of the county connection with Walterboro and secure long distance connections.

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NASHVILLE, TENN.—Secretary of State John W. Morton has granted articles of incorporation to the Tri-State Telephone Company of Shelby County with a capital stock of $10,000. The incorporators are Charles D. M. Greer, J. T. Warren, F. N. Fisher, L. T. Cavanaugh and A. Outsen.

HUBBARD CITY, TEX.—The Hubbard City Telephone Company has been incorporated with a capital stock of $5,000 by C. W. Hobson, A. L. Collins and Hyde MacFarlan.

JACKSONVILLE, TEX.—The Jacksonville Telephone Company has been incorporated with a capital stock of $15,000 by W. H. Sory, W. H. Sory, Jr., and M. L. Sory, of Jacksonville.

THORNTON, WASH.—The Interstate Telephone & Telegraph Company has filed articles of incorporation with a capital stock of $5,000. The officers are J. J. Stephens, president; Nelson Howard, treasurer, both of Thornton; Dr. T. A. Swain, of Pine City, secretary and general manager.

GRANTSBURG, WIS.—The Mutual Telephone Company of Grantsburg has been incorporated with a capital stock of $100,000 by Simon Thoreson, Anton M. Anderson and William R. Ahlstrom.

PEWAUKEE, WIS.—The Pewaukee & Sussex Telephone Company has been incorporated with a capital stock of $2,000 by A. T. Larson, S. L. McDowell and William Parker.

ELECTIONS.

BLAKELY, GA.—At a meeting of the Board of Directors the following officers were elected: Arthur G. Powell, president; Wade H. Powell, vice-president and general manager, and Kathleen Odum, secretary and treasurer. The company will soon have its line completed to Albany, when work will begin on the exchange at that place.

LAWRENCEVILLE, ILL.—The following officers have been elected by the Starr Line Telephone Company, which has been incorporated with a capital stock of $100,000: President, H. H. Knipe; vice-president, J. H. Senseman; secretary, G. W. Chamblin; treasurer, A. H. Calvin.

DECATUR, IND.—At a meeting of directors of the Citizens' Telephone Company the following officers were elected: Henry Hite, president; John Baker, vice-president, and E. X. Ehinger, treasurer.

NORTHVILLE, MICH.—At the annual meeting of the Northville Telephone Company all the old officers were re-elected. The company now has 186 telephones and twenty miles f lines in operation.

WEST MILTON, O.—The West Milton Home Telephone Company has elected the following officers: Dr. W. H. Kessler, president; Charles Ammon, vice-president; Havilah Coppick, treasurer, and C. E. Emerick, secretary and general manager.

COMBINATIONS.

MAROA, ILL.—The People's Telephone Company has sold its system to the Maroa Mutual Telephone Company, which was recently organized. The consideration was $13,500.

SIDELL, ILL.—The Sidell Telephone Company has purchased the plant of the Douglas Cunty Telephone Company at this place and Allerton.

STERLING, ILL.—The Farmers' Telephone Company of Lee County has bought the Lee County Telephone Company's system at Franklin Grove, Ashton, Amboy, Lee Center, Sublette and Walton.

CARROLLTON, MO.—The Carroll County Telephone Company has sold its exchange and line to the town of Tina and the rural lines running into Tina.

WAYNE, NEB.—F. B. Bell has sold the Wayne Telephone System to Arthur Overshiner, of Chicago. The line, however, will be managed by local people, the officers being A. J. Ferguson, president; A. N. Matheny, secretary and treasurer, and L. F. Heur, superintendent.

NASHVILLE, TENN.—The half interest in the Cullman, Ala., Telephone Company, owned by E. T. Gable, has been sold by him to S. L. Sherrill, of Hartselle, Ala., who owns the system at the latter place. The two companies will be consolidated and the entire system improved and extended. A line already in operation from Hartselle to Lacon will be carried into Cullman and give connection with those two points to Decatur and New Decatur. Walter Gable owns the other half of the Cullman company.

UNDERGROUND.

RIVERSIDE, CAL.—The Home Telephone Company is placing its wires underground.

HOUSTON, TEX.—The aldermen have instructed the city engineer to prepare specifications for the Citizens' Telephone Company for the immediate laying of 3,000 feet of underground conduits according to their franchise.

PERSONAL.

R. D. ADAMS has been appointed manager of the South Western Telegraph & Telephone Company's system at San Antonio.

O. F. ALLEN, of Temple, Tex., has been appointed manager of the local Exchange of the Southwestern Telephone & Telegraph Company.

A. C. BRANUM has been delegated by the Belmont Telephone Company to establish an exchange at Bethesda, W. Va.

R. O. BRUSH, of Middleport, N. Y., has been appointed manager for the Home Telephone Company's system at Batavia, N. Y., to succeed J. C. Burton, who takes charge of the sysem at Dunkirk.

F. W. BRIGGS, of the Chicago Telephone Supply Company, paid a visit to New York last week and left for home on Wednesday. He will make the trip in his touring automobile.

R. G. CRANE has been appointed manager of the Home Telephone Company's exchange a Long Beach, Cal., in place of J. D. Love, resigned.

F. J. PAYAK has opened an office at Room 234, Crossley Building, San Francisco, Cal., for telephone engineering and construction of Independent telephone systems.

F. L. VAN ALMEN has been appointed manager for the Fox River Valley Telephone Company at Appleton, Wis., in place of F. S. Green, who has resigned to go to Los Angeles.

MISCELLANEOUS.

SAN JOSE, CAL.—The Holmes Brothers are promoting a telephone system in the Rueker and Orchard districts in Santa Clara county.

DENVER, COLO.—The Denver Telephone Company has brought suit against the Colorado Telephone Company for $1,800,000 damages, which it alleges is due on account of the Colorado Telephone Company causing its franchise to be revoked.

CHICAGO, ILL.—The Burlington Railroad will operate its system of train dispatching by telephone.

TUSCOLA, ILL.—J. H. Robinson has sold the Tuscola Company's plant to J. S. Campbell.

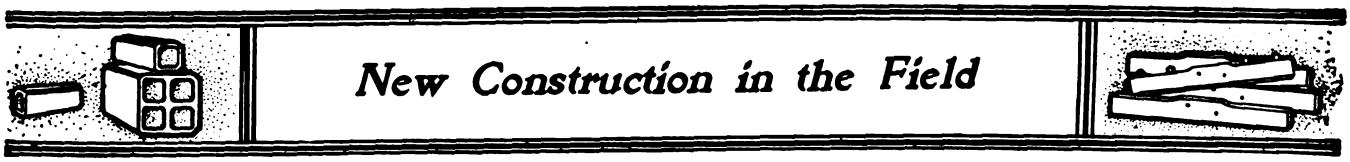
LAWRENCE, KAN.—The Lawrence Home Independent Telephone Company will install an automatic exchange.

ALEXANDRIA, O.—The new Independent exchange has secured 100 subscribers.

CLEVELAND, O.—It is reported that the Gould interests in New York are endeavoring to enter Cleveland.

NEWARK, O.—The Newark Telephone Company has increased its number of subscribers within the past few months frm 650 to 1,600.

KENOSHA, WIS.—A company has been formed here to take over and manufacture the telephone patents granted to W. E. Egan.



BLACK SPRINGS, ARK.—The Black Springs Telephone Company will commence work on the Cherry Hill and Oden line immediately.

JACKSONVILLE, ARK.—The Local Telephone Company has completed the line to Cabot and is now constructing a line to Lonoke.

SANTA MONICA, CAL.—The Home Telephone Company is rushing work on its long distance line. A franchise will be asked for in a short time.

WHITTIER, CAL.—J. T. Spencer, general manager and secretary of the Whittier Home Telephone Company, left here recently to visit Kansas City, St. Louis, Chicago and New York. While in Chicago Mr. Spencer will probably purchase material for reconstructing the local system. Gus. Wardman is acting manager at present.

MOLINE, ILL.—The Union Electric Telephone Company is arranging to construct a through metallic circuit connecting its local office with Taylor Ridge.

SPRINGFIELD, ILL.—New telephone cables are being laid between this city and Taylorville.

NEW ALBANY, IND.—The wire is being strung for a telephone line which will connect Corydon and De Pauw.

SOUTH BEND, IND.—A contract has been agreed upon with the Long Distance Telephone Company of Indianapolis which will give long distance service to Indianapolis. Direct connection may now be secured as far south as Kansas and St. Louis, Mo., and Louisville, Ky. All of the points in the southern part of Indiana may also be reached. A copper metallic circuit will be provided to Logansport from this city.

DES MOINES, IOWA.—The Mutual Telephone Company is planning extensions of its lines to Adelphi and Ivy.

READFIELD, ME.—The Crosby Telephone Company has purchased a larger switchboard and will move into larger quarters as soon as construction work is completed.

SOUTH CHINA, ME.—The China Telephone Company will begin work immediately. A. M. Fogg, of East Hebron, is in charge of the work.

OAKLAND, MD.—The Maryland Telephone Company is building a line from Baltimore to Romney, where it will connect with the Piedmont and Keyser company.

HOLLISTON, MASS.—The telephone company is constructing a new farmers' line.

MONROE, MICH.—The Stoddard Telephone Construction Company of Monroe has begun work on the construction of its new exchange. Direct connection with the Home Telephone Company of Toledo will be made.

NORWAY, MICH.—The Menominee Range Telephone Company is constructing a cable system in this town.

GLENCOE, MINN.—The Glencoe Telephone Company is enlarging its exchange and putting up rural lines in the surrounding country.

GOODHUE, MINN.—The Goodhue County Telephone Company is enlarging its telephone system, making many new improvements.

HECTOR, MINN.—The Hector Telephone Exchange Company has completed eighteen miles of rural line and is making improvements in its exchange.

TWO HARBORS, MINN.—E. J. Cooper, of Minneapolis, has been looking over the ground in Lake Superior with a view to building a telephone line between Two Harbors and Grand Marais.

WALDFN, MINN.—A telephone line is being organized at Walden and will run its line to Starbuck.

CLAYTON, MO.—Manager Houseman, of the St. Louis County Telephone Company, says the company will be in operation as far as Kirkwood within the next two months, and that the entire county system will be installed by spring.

PENTWATER, MICH.—The Lake Shore Telephone Company has about concluded work on the installation of its automatic telephone service in this town.

MONTEVIDEO, MINN.—The Montevideo Telephone Company has built eight new farmer lines this summer.

CANANDAIGUA, N. Y.—The new telephone line between Canandaigua and Rochester of the Interlake Telephone Company is rapidly nearing completion.

CLIFTON SPRINGS, N. Y.—The new telephone line which is being constructed to connect the villages of Clifton Springs and Newark is nearly completed.

HONEOYE, N. Y.—The Empire Telephone Company is erecting a new line. It is rumored that a number of farmers will ask that lines be extended to their residences.

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TRADE NOTES.

THE S. H. COUCH COMPANY, of Boston, Mass., has filled a long-felt want in its Workwell Telephone. It is a thoroughly reliable set for short lines and can be used where any battery bell could be used. Bulletins free.

THE STERLING ELECTRIC COMPANY, of LaFayette, Ind., in addition to their pole boxes and outside terminals, have added to their line of manufacture an iron pole seat, which will meet with favor with construction people. The new telephone catalogue just being distributed by the Sterling Electric Company is a credit to that company and shows their advancement and progress in the instrument line by way of improvement and new designs.

THE BAIRD MANUFACTURING COMPANY, Chicago, reports a constantly increasing number of repeat orders for its pay stations, which indicates that Baird pay stations are a most profitable investment. During this month it has received an order for 300 additional pay stations from a telephone company in a large city which already has about 2,500 of these machines in service. The wideawake telephone manager will find that it will pay him to give the matter of pay station service very careful study.

A. N. MATTHEWS & BRO., 619 Carleton Building, St. Louis, have issued a second folder of a series which is devoted to droll descriptions of the worth of Stombaugh guy anchor. The durability of this anchor is entirely proved by Mr. Very Durable in an amusing manner. Among other witty remarks he refers to the Egyptian pyramids and the sphinx as evidence of the durability of the work done by his ancestors and claims that the use of Stombaugh guy anchor is as far ahead of other methods of guying as an Egyptian mummy is ahead of placing a dead man in a trench and covering it with earth. This folder will be mailed to all parties interested.

THE WILLIAMS TELEPHONE & SUPPLY COMPANY, Cleveland, O., has issued a new booklet entitled "Telephone Line Construction and Equipment." A good description is given of organization, together with a form for constitution and by-laws. Line construction is taken up and a general description given of the various materials which are necessary and the methods of construction to be used. Circuits are treated in a careful way and details are given of the various methods employed, together with diagrams. A brief outline of construction costs is given, together with a few reasons why the selection of "Williams" apparatus is one which will never be regretted. The company will be pleased to furnish this booklet and all information desired upon request.

THE CONTROLLER COMPANY OF AMERICA has recently secured a statement from E. H. Martin, of Waterloo, Iowa, that coin controlled telephones are bound to be adopted throughout Iowa; in other words, telephones that will not work unless a nickel is put in for each conversation. Mr. Martin is conceeded to be a very progressive and far-sighted telephone man, and his predictions are significant of the future development along this line, not alone in Iowa, but throughout the United States. At the same time as Mr. Martin's predictions, word is received from Mr. Higgins, of the Home Company at Los Angeles, a company that has done wonders in the way of progressive stunts, "that it has installed a large number of five-cent controllers over the city which are giving good satisfaction and proving a source of revenue, and that this service will be extended so as to cover territory where single lines will not pay."

THE MONARCH TELEPHONE MANUFACTURING COMPANY, of Chicago, has, after about eighteen months of careful study and experiment, produced a magneto switchboard, which it claims is the most up-to-date and practical board yet manufactured. The special tools required in making the drops and jacks, keys and other parts are almost finished, and the company can promise deliveries of complete boards within six weeks. A small folder, as a forerunner to a more complete catalogue, is now being printed and will give the reader an idea as to the mechanical construction of the various parts, as well as the method of assembly. Several new features are shown which it will pay any one interested in this class of apparatus to get further details of. Sample drops, etc., prices and full particulars will be sent to interested parties addressing the Monarch Telephone Manufacturing Company, 10-16 South Clinton street, Chicago, Ill.

FRANK B. COOK, of 238 West Lake street, has been meeting with the most flattering success with his No. 444 protector, which is equipped with self-soldering heat coils. This protector is manufactured under Mr. Cook's own exclusive patents, and it has been giving the best satisfaction to the many companies who have installed it. Some of the recent shipments of complete distributing frame equipped with a No. 444 protector have been those to the Pittsburg & Allegheny Telephone Company, for their Homestead exchange, a frame equipped for 600 lines, with an ultimate capacity of 700 lines. The United Telephone & Telegraph Company, of Pittsburg, a frame equipped for 100 lines, with an ultimate capacity of 200 for their exchange at Lewisburg, and a frame with a capacity of 100 lines for Norristown. The Milton & Milton Junction Telephone Company, a frame with a capacity of 100 lines for their exchange at Milton Junction, Wis.; the Yuma, of Yuma, Ariz., a frame equipped for 105 lines, with an ultimate capacity of 200 lines; the Sabine Valley Telephone Company, of Center, Tex., a frame equipped for 200 lines, with a capacity of 300 lines; the Kentucky & Indiana Telephone Company, of Owensboro, Ky., an ultimate capacity of 1,300 lines, equipped for 1,260; the Albemarle Telephone Company, of Charlottesville, Va., an ultimate capacity of 300 pair, equipped with 100 .

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE CHEAP—Sixty series and bridging magneto Telephones recently taken out of service on account of change of equipment to central energy. Will sell in lots of two or more. Write for particulars. M. R. TRACEY, 231 Huron street, Toledo, O. 251

WANTED TO SELL.—A telephone system operating in eight counties in a western State, with five small exchanges. Good city connections and a first-class investment. Easy terms to the right party. Address, Box 239, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 239

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

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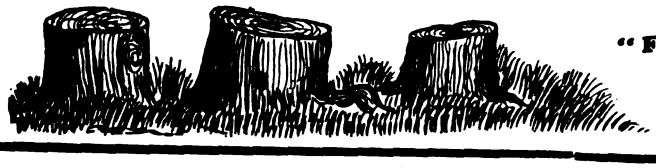

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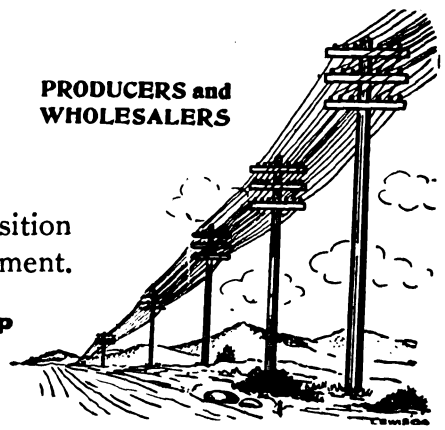

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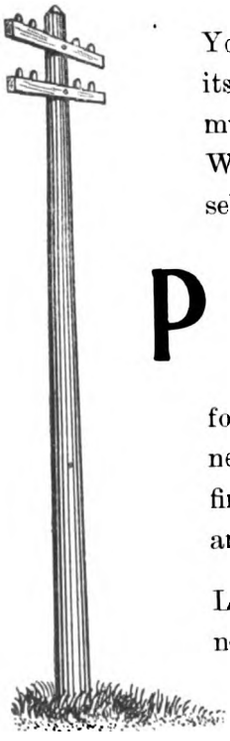

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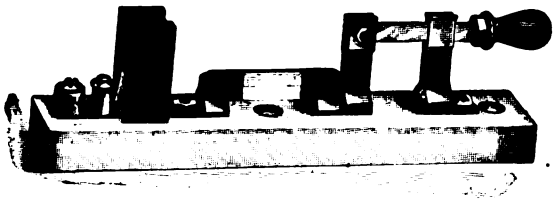

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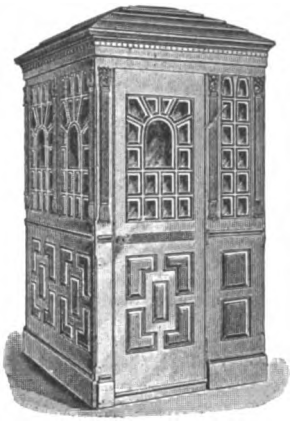

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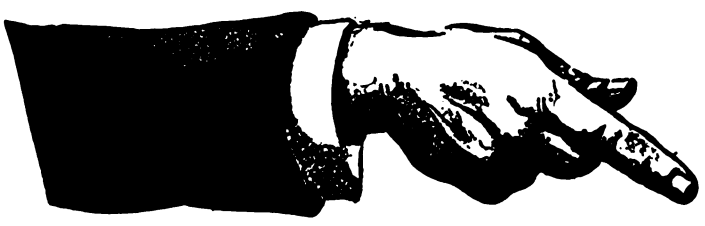

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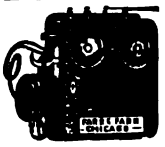

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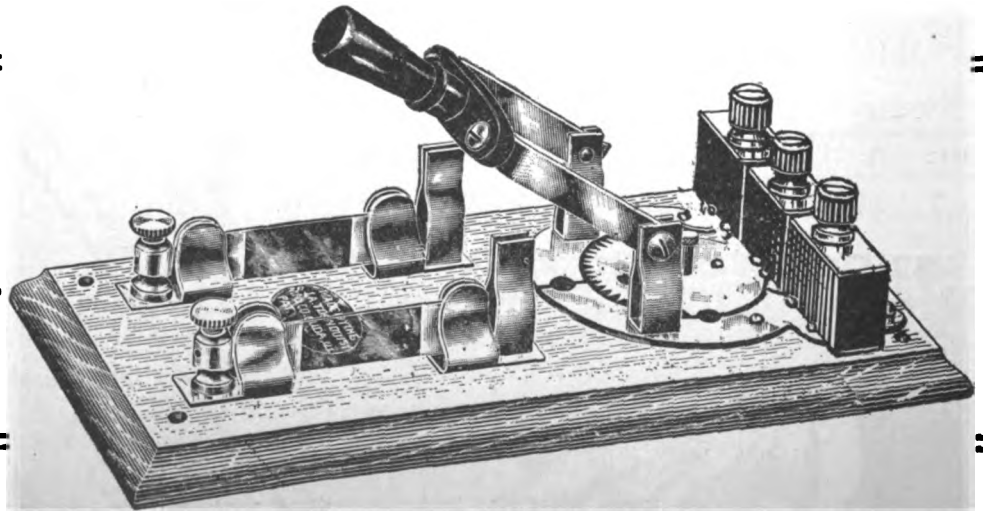

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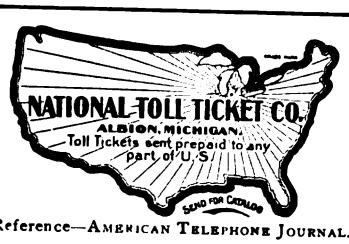

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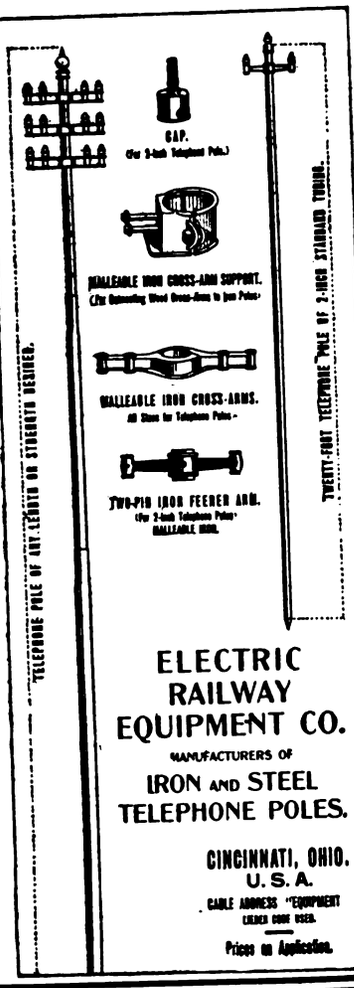

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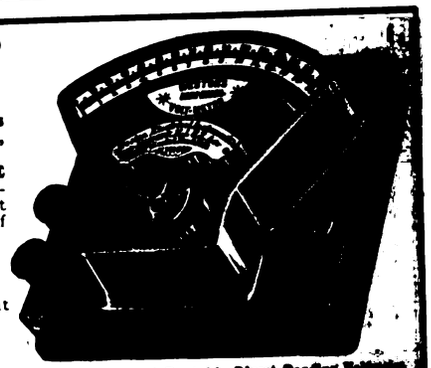

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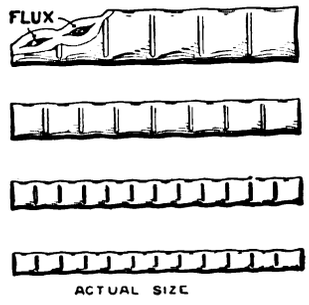

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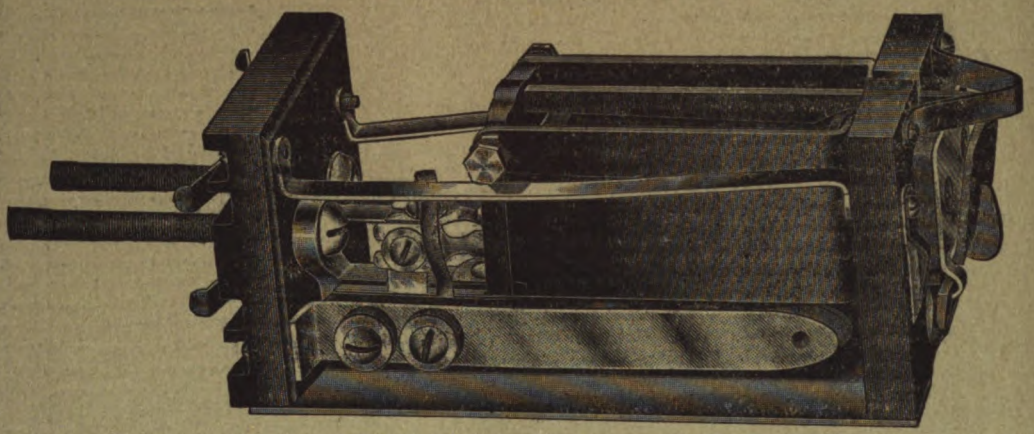

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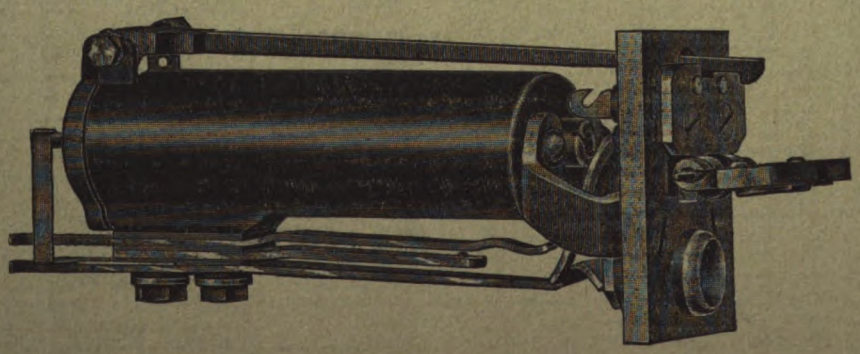

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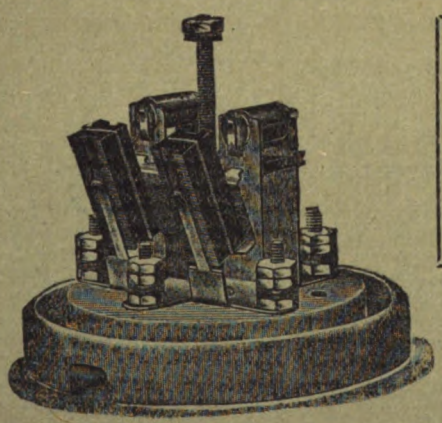

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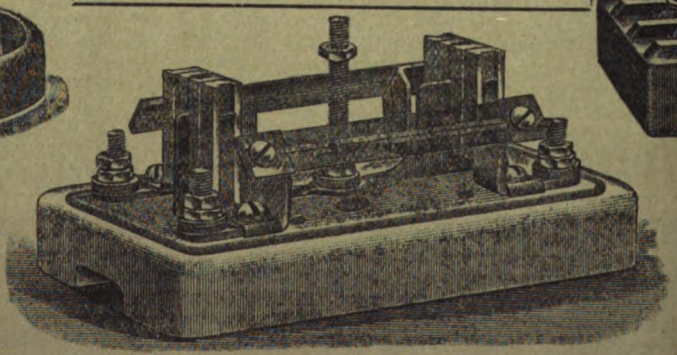

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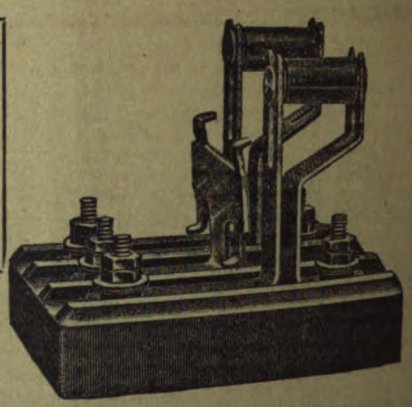

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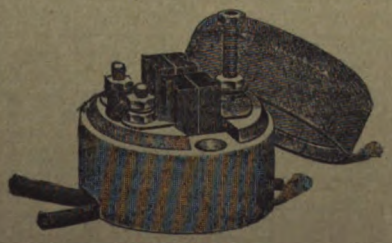

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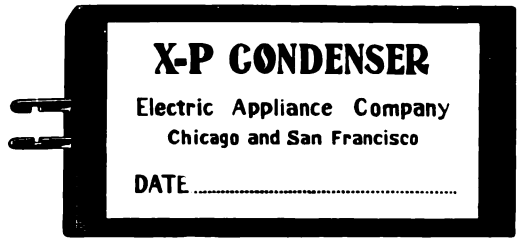

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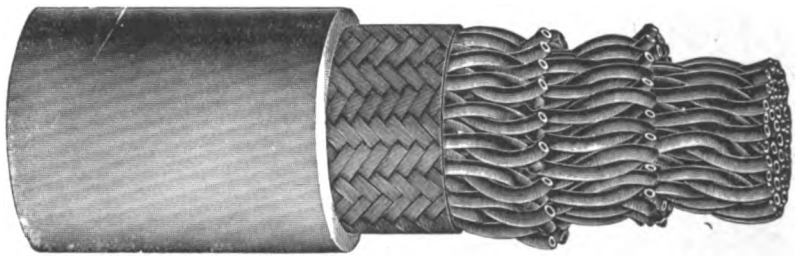

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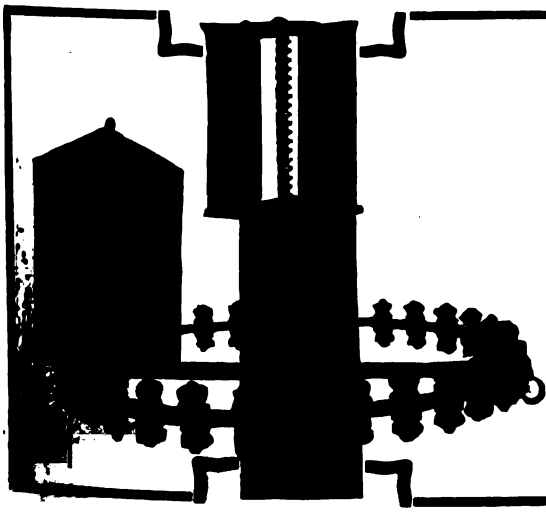

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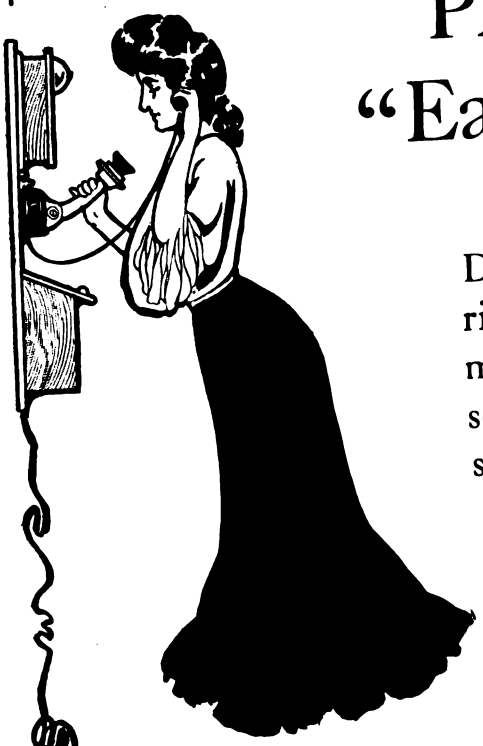

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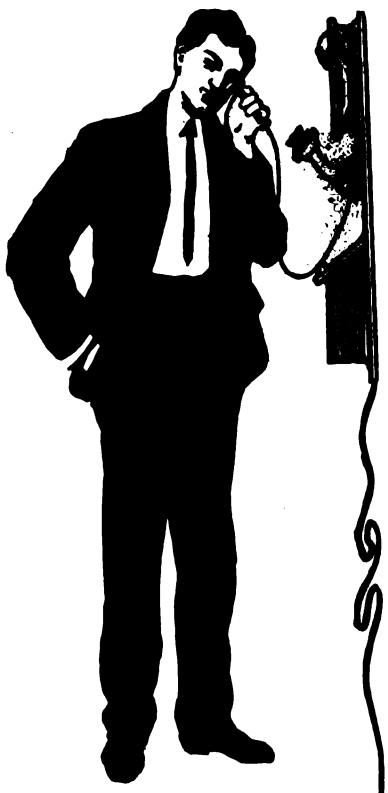

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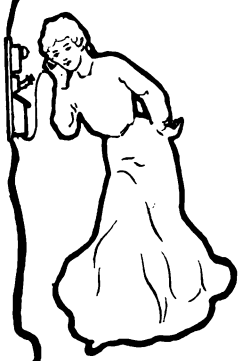

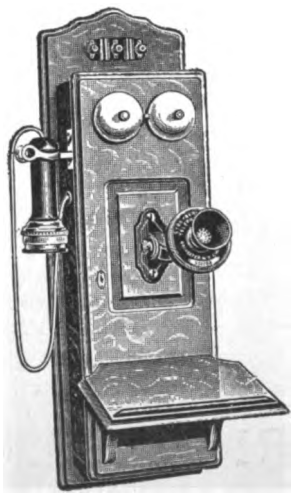

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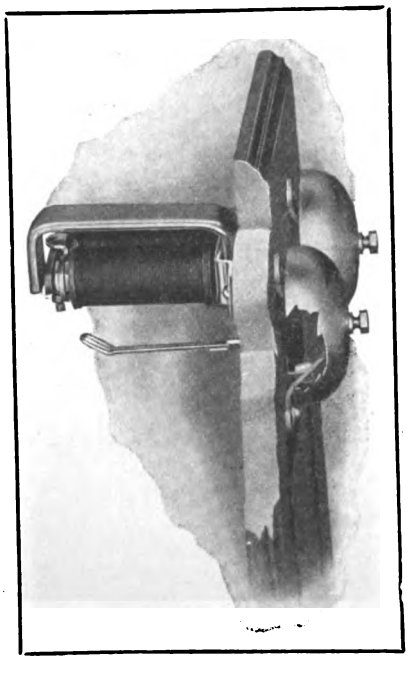

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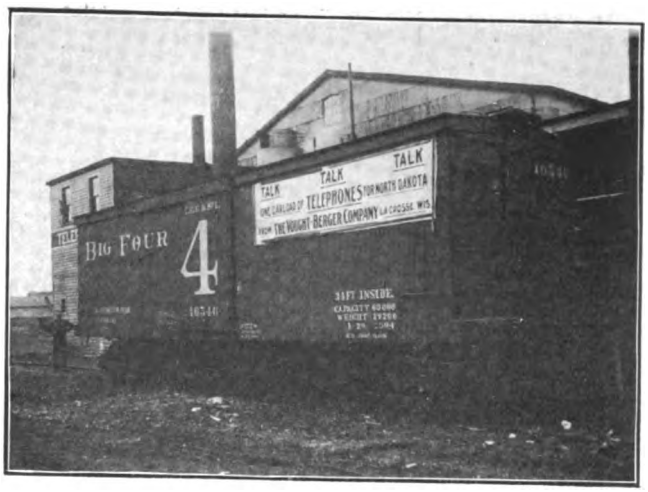

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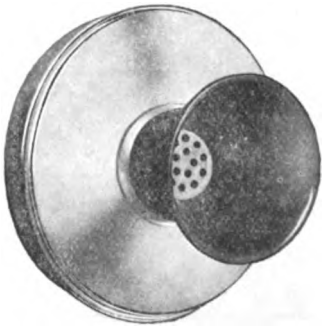

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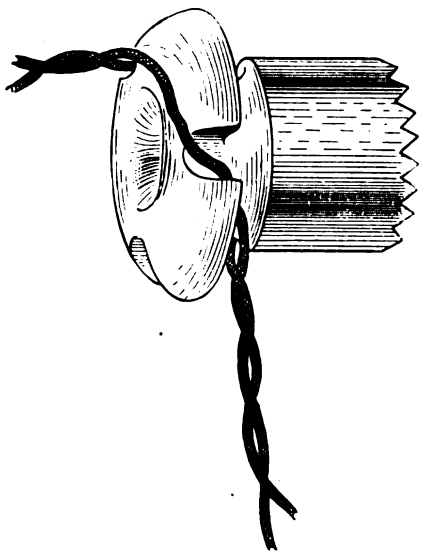

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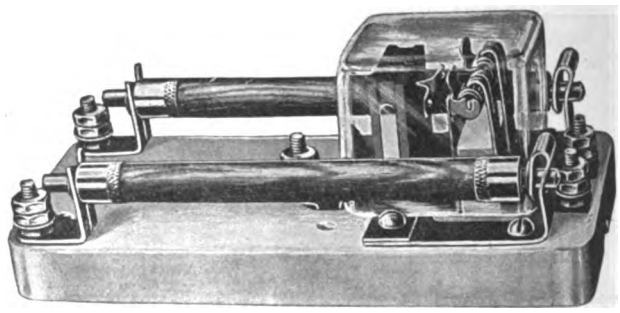

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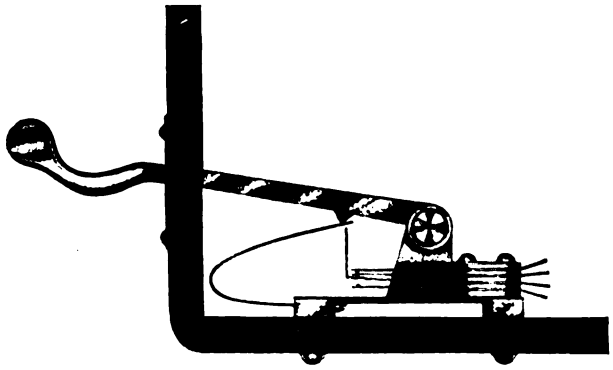

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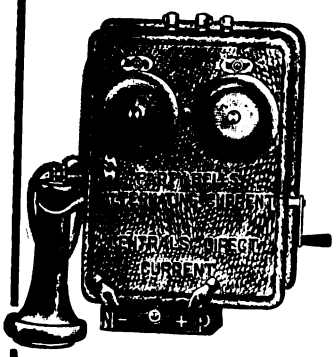

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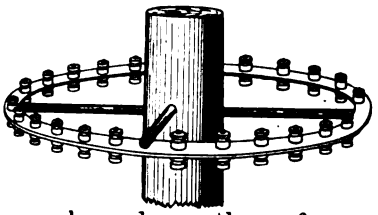

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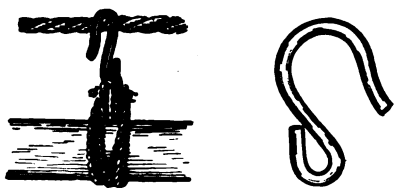

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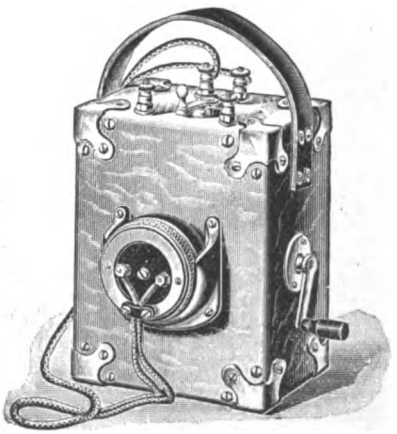

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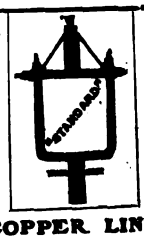

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VOLUME 10 *SATURDAY, OCTOBER 8, 1904* *NUMBER 15*

THE USE OF THE TELEPHONE IN RAILROAD OPERATING

By Elmer Stone.

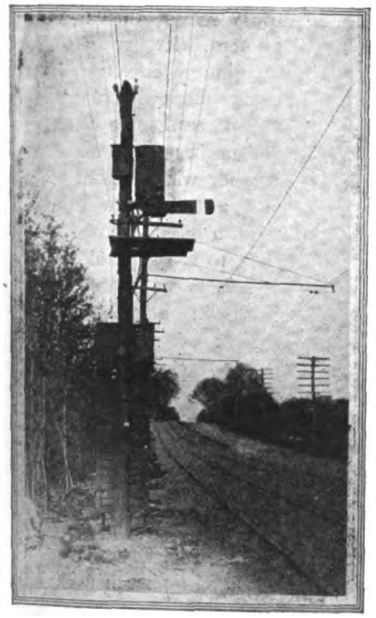

Fig. 1. Semaphore Set at Stop.

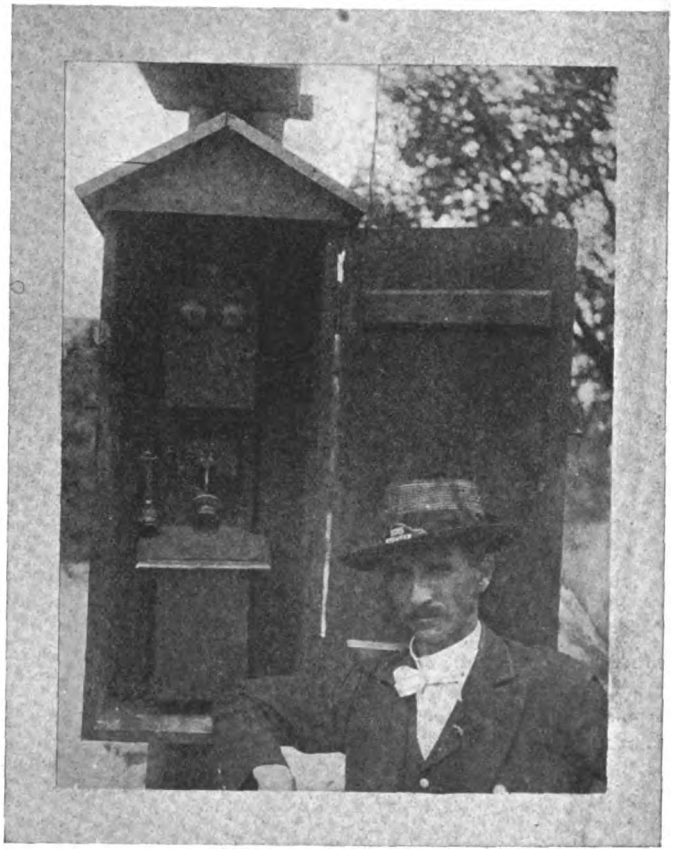

Fig. 2. Street Railway Telephone in Newark, N. J.

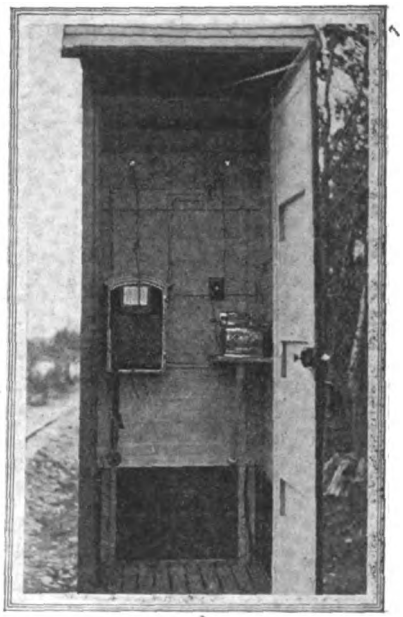

Fig. 3. Interior of Signal Station.

THE use of the telephone in conjunction with the operation of electric railroads is becoming more general every day, and a number of steam railroads are equipping parts, if not of all their systems, with telephones. In fact, in some instances the dispatching of trains is being done by telephone, thus supplanting the use of the telegraph.

The Illinois Central Railroad has operated a telephone system for quite some time over sections of its road, and recently decided to make numerous extensions with a view to long-distance service. The New York Central Railroad, as well as the Erie, are building long-distance lines between their termini in New York and Chicago, and the Pennsylvania lines have telephone systems in operation at all important points. The Chicago, Burlington and Quincy Railroad, after a number of experiments, has decided to use the telephone in train dispatching and it is certain that within a short while the use of the telegraph will be only auxiliary to if not entirely supplanted by telephonic communication.

The application of telephony to railway work involves features which are entirely foreign to its general application and which have heretofore caused a disinclination upon the part of railway operators to use it any more than as a local auxiliary to the yards or train sheds.

The principal objection has been the lack of permanency in the matter of records. With the telegraph the act of recording the message is a check upon the sending and receiving operators, but with the telephone there was no means of proving the correctness of a transmitted message. Another feature which formed a considerable drawback was the uncertainty of correct transmission; that is, would the receiving station receive the message exactly as it was transmitted?

It is a well-known fact that with the earlier types of transmitters and receivers it was almost impossible to distinguish between certain similar sounds. The writer is acquainted with an instance where a telephone system was installed in a large restaurant for the purpose of sending orders to the kitchen. Special care was taken in the design of the transmitters and circuits that the transmission should be as perfect as possible. After the system was completed everything worked to perfection. The enunciation of all the words that were used seemed perfect and all parties were congratulating themselves upon the system's success when an order calling for Swiss cheese was made and the receiving end interpreted it as split peas. All sorts of tests were made to get over this difficulty, but it proved the Waterloo of the system, and it was discarded shortly after. One can readily understand that in train dispatching there must be some means whereby a check can be placed upon a system and also that the apparatus must be as nearly perfect as possible.

The rapid increase in the use of electric railways for inter-

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urban service and their invasion of the field of steam roads for distances of forty or fifty miles, or even greater, has accentuated the necessity for essentially the same methods of operation for electric as has proven best in steam road practice, including the use of regular train or car dispatchers; simultaneously there has arisen the question of communication between dispatchers and car crews, so that in the event of any unforeseen derangement of traffic or advisable change in operation, the dispatcher could communicate with his various train crews and change his orders to meet the new conditions. The relative necessity for thus communicating with crews cannot be measured by the track mileage for the reason that for a given number of miles of track the electric road will operate at least three or four times as many train units as the steam road under ordinary conditions, while on special days and holidays the electric road traffic will increase in a much greater proportion.

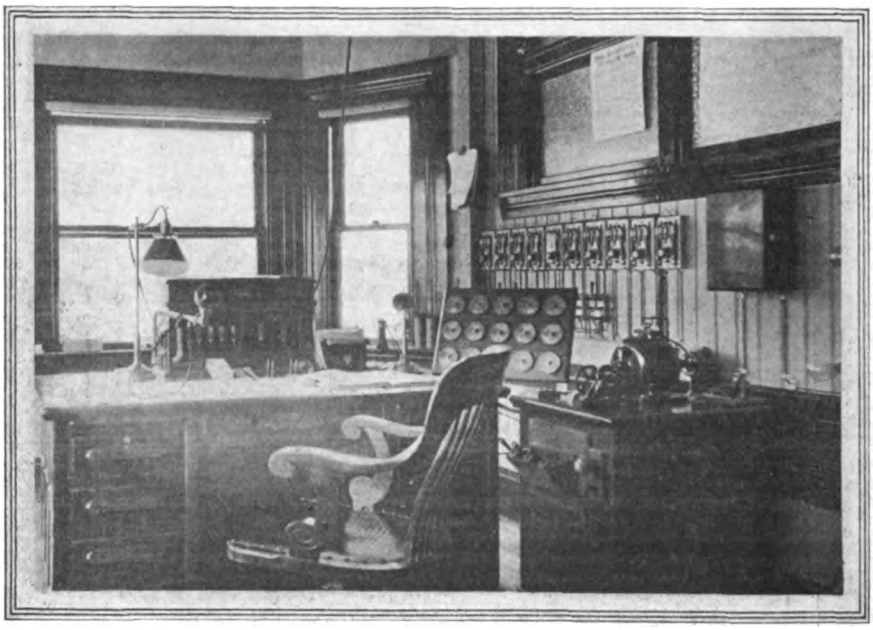

Fig. 4. Dispatcher's Office.

In winter, when snow plows and sweepers must be sent over the lines the need for this power of communication likewise becomes acute to a greater extent on the electric road.

Realizing this fact, the management of many electric roads installed telephones at certain points. An illustration of one method is shown in Fig. 2. This station is on a short line and is used by the inspector to communicate with the car stables in emergency cases. In other instances stations have been placed at different points along the track, either in the shape of waterproof telephone boxes or else a telephone is carried on the car and connection made by means of a pole which hooks over the telephone lines, or else a jack box is mounted on a pole and a flexible cord used.

With these methods the problem, so far as allowing the car crew to communicate with the dispatcher, or starter, as he is sometimes called, is solved, but the more important matter of permitting the dispatcher or starter to selectively communicate with the car crews is not. To accomplish this, in many cases, orders are given that at certain points all car crews should stop and call up the dispatcher, or the dispatcher might display signals or ring bells at all telephone points and, after stopping all traffic for a few minutes, select the crew desired and give his orders.

It will be evident to the reader that methods such as these leave much to be desired not only in the amount of time that might be saved, but also that the very effect desired, namely, the operation of a system upon a schedule, is lost through the delay to the different train units.

To further realize the truth of this argument, let anyone imagine every train being stopped on a steam road, for instance, because a dispatcher wished to direct a train crew to take a certain cross over to run around a wrecked or disabled train in a double-track road, or if on a single-track to notify a train to advance ten or fifteen miles rather than wait for the passing of another train that was considerably behind its schedule.

Since the telephone has reached a state of perfection that makes it as safe and reliable as any human agency can be, its use has become so general that everyone who is accustomed to it can use it with facility. It is an ideal method of communication, provided no specially trained operator is needed to handle it, and that there is some method used in conjunction with it to verify reports.

The one point that has been lacking to prevent its general use in railroad operating is some means of signaling that is simple in mechanism, positive in action and reliable in service that can be operated by the dispatcher so as to call to a telephone at any desired point, and *at that point only,* any one of the crews on the line.

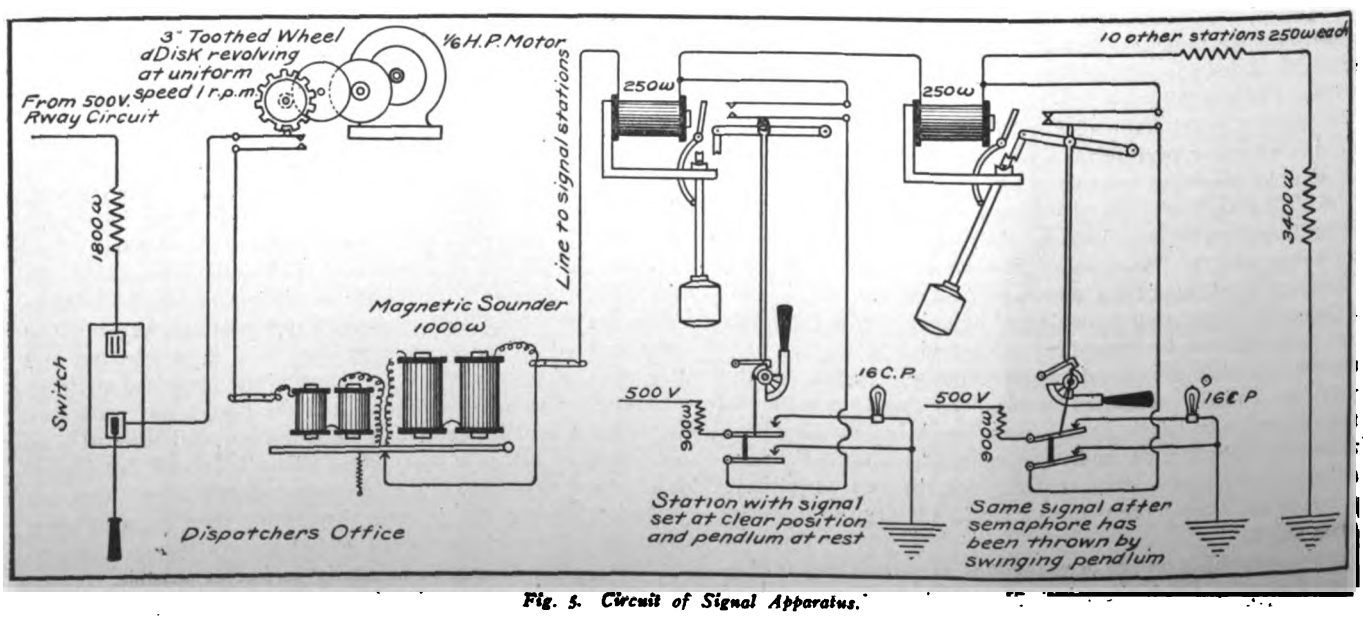

Fig. 5. Circuit of Signal Apparatus.

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A system designed by the Blake Signal Company to meet these requirements has been in operation on the Boston & Worcester St. Ry. Co. for a period of five months, during a winter of exceptional severity, involving the severe tests of extreme cold and quantities of snow, ice, sleet, etc.

Over the entire line a first-class telephone system was installed and at all important operating points or turn-outs a signal has been placed. All telephone signal stations are furnished with an autographic register, which renders in triplicate the orders received at the station. The method of operation employed in this instance is as follows: Suppose the dispatcher wishes to communicate with a car crew approaching station No. 9. He picks up a three-inch toothed disk, numbered to correspond with the signal which he wishes to set, and slips it on a constant speed motor driven shaft located directly at hand. This throws a four-foot semaphore to a "stop" position at the station required, at the same time illuminating a red lens for a night signal.

As soon as the semaphore is properly set at "stop" the dispatcher is automatically notified of this fact by the operation of a magnetic sounder in his office. When the car arrives at the station, the conductor unlocks the booth and calls the dispatcher by telephone, saying, "Brown & Hayes at No. 9 for orders." The dispatcher then transmits his orders to the conductor, who writes them on the autographic register, repeats them back to the dispatcher, takes one written copy for himself, hands one to his motorman and the third copy is wound on a roll within the register where it is accessible only to the management. The conductor then pulls a cord which sets the semaphore at "clear" position ready for future operation. Figure 6 shows the semaphore set at "clear," Figure 1 at "stop" position and Figure 3 shows interior of booth with telephone on left, autographic register on right and cord suspended over telephone for resetting of signal. Figure 4 shows interior of dispatcher's office and Figure 5 shows a circuit of the apparatus.

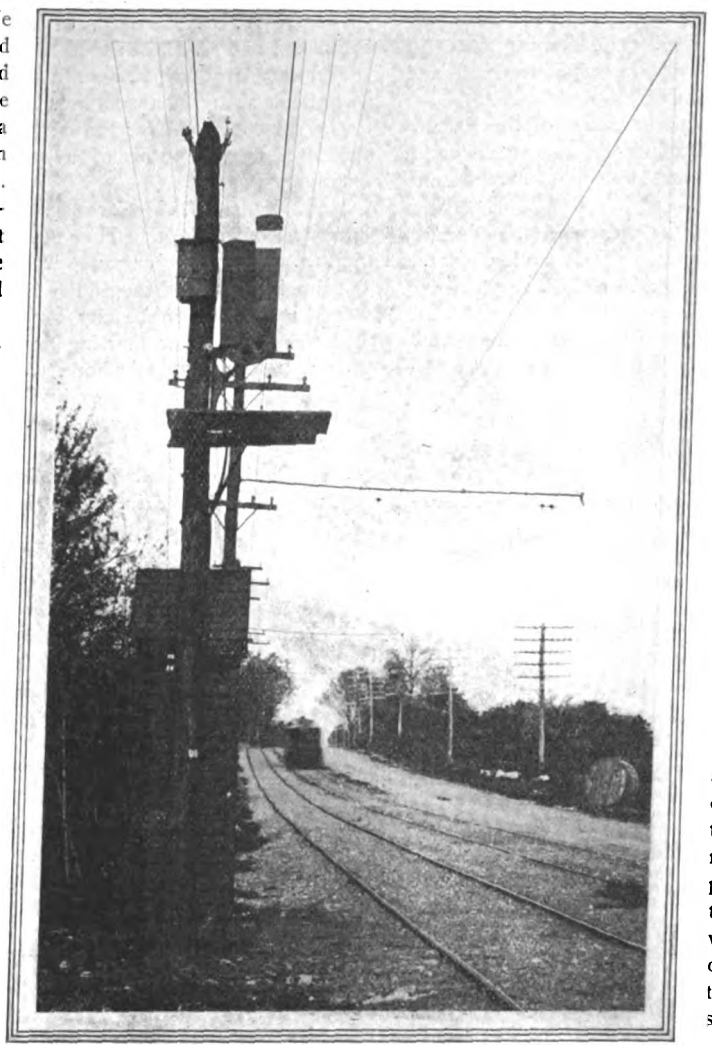

Fig. 6. Semaphore Set at Clear.

In designing the mechanism to operate the signal one of the principles of elementary mechanics was employed. Briefly stated, it is this—*the period or time of vibration of a pendulum of certain length is always the same.* Each signal box upon the line contains an electromagnet and a pendulum. The electromagnets are all in series on a single wire, a ground return being used preferably, although in case of need a metallic circuit could be employed. The pendulums for each of the signals are of different lengths and respond only to impulses from the electromagnets, which may be energized at various intervals corresponding with their respective periodicity of vibration.

It may be interesting to note in passing that a principle involving similar laws was employed by W. W. Dean in devising a selective ringing system. In operation the dispatcher, either by the use of a constant speed shaft on which he places toothed wheels for making and breaking contacts at various intervals corresponding with the periods of the various pendulums, or by means of setting in motion a pendulum corresponding in length and consequently synchronous with the pendulum of the signal which he desires to set, causes electrical impulses to be sent over the line at certain intervals which affect all of the electromagnets. These impulses are felt by all the pendulums, but are only cumulative in increasing the arc of vibration of that pendulum whose period is synchronous with the predetermined period of electromagnetic impulses. After from ten to twenty seconds, depending upon the length of the pendulum, it swings through an arc of sufficient length to enable it to trip the lock holding the semaphore in a vertical or "clear" position, and the semaphore at once falls to the horizontal or "stop" position.

When the semaphore has reached the horizontal position it automatically closes a lamp switch which gives the illuminated signal needed for use at night. Each signal is equipped with two incandescent lamps, so that, in the event of one lamp being burned out when the semaphore is set at "stop," the other lamp is automatically connected to a periodically interrupted circuit and gives a flashing danger signal. When in a horizontal position the semaphore also automatically closes a circuit which gives a magnetic sounder signal to the dispatcher, notifying him that the signal has been set as desired.

To ensure a constant speed with the widely varying voltages of electric railway circuits a governor is placed on the motor shaft. Another method which is also employed in place of a motor is the use of a master pendulum which removes the necessity of using current to operate the motor and is, besides, absolutely positive in action.

With some modifications a system similar to this could be applied to steam roads, especially on single-track branch lines where traffic is insufficient to warrant the expense of maintaining a force of telegraph operators. In such service, since there would probably be no electric current available for operating the motor in the dispatcher's office and the signal lamps on the line, the master pendulum could be used in the first case and batteries at each signal for the lamps.

The amount of current used in energizing the electromagnets and operating the signals is eight-hundredths (.08) of an ampere with a voltage of 650, equivalent to 52 watts, for the few seconds necessary to operate the signal, or an average of about .000217 k.-w. hr. for each time a signal is set. A one-sixth horsepower motor is sufficient for revolving the toothed disks in the dispatcher's office, and is in operation only while signal is being set. The signal should be installed preferably entirely independent of the telephone, a single No. 10 galvanized iron wire with ground return being sufficient for line connections.

In this way the cost of installation can be made as low as possible compared with other methods of railroad communication.

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REPORT OF PENNSYLVANIA STATE INDEPENDENT TELEPHONE ASSOCIATION CONVENTION

(By our Special Correspondent, W. G. Newbold.)

THE annual convention of the Independent Telephone Association of Pennsylvania was held at Harrisburg on September 27th and 28th. This convention was in many ways a surprise to the people of the State, who had only in a general way realized the importance of the Independent movement and its benefits to the subscribers. The evening issues of the newspapers displayed a large amount of enthusiasm and carried the story of the proceedings with display heads.

H. E. Bradley, of Philadelphia, superintendent of the Eastern Traffic Association, arrived in Harrisburg on the afternoon of the 26th and established headquarters at the Commonwealth Hotel.

The first step toward active business was taken on Tuesday morning, when the executive committee met. Following this came a meeting of all of the delegates at 8 o'clock that evening, when the permanent organization was effected.

The city in which the convention was held was honored by the body electing as its president Benjamin F. Meyers, of Harrisburg. Mr. Meyers is president of the Cumberland Valley Telephone Company, and one of its largest stockholders.

Other officers were elected as follows: First vice-president, R. E. Flinn, Pittsburg; second vice-president, Charles Griffith, Johnstown; secretary, H. E. Bradley, Philadelphia; treasurer, C. E. Wilson, Philadelphia.

The following executive committee was elected: B. F. Meyers, Harrisburg; C. W. Kline, Hazleton; C. E. Wilson, Philadelphia; J. G. Splane, Pittsburg; R. E. Umbel, Uniontown; W. D. Barnard, Philadelphia; E. D. Schade, Johnstown; William B. Trask, Erie, and G. B. Rudy, York.

The members of the old executive committee, responsible for the calling for the convention which resulted in the Pennsylvania State Independent Telephone Association, were:

C. E. Wilson, of Philadelphia, general manager of the Keystone Telephone Company and president of the Keystone State Telephone Company; J. G. Splane, of Pittsburg, president of the Pittsburg and Allegheny Telephone Company; Hon. R. E. Umbel, of Uniontown, president of the Maryland, Pennsylvania and West Virginia Telephone and Telegraph Company; W. D. Barnard, vice-president of the United Telephone and Telegraph Company; E. D. Schade, of Johnstown, secretary of the Johnstown Telephone Company; Senator C. W. Kline, of Hazleton, president of the Consolidated Telephone Company, of Pennsylvania; William B. Trask, of Erie, president of the Mutual Telephone Company, of Erie; George B. Rudy, of York, general manager of the York Telephone Company; H. E. Bradley, of Philadelphia, superintendent of the Eastern Traffic Association, and Hon. B. F. Meyers, of Harrisburg, president of the Cumberland Valley Telephone Company.

F. A. Wunder, of Philadelphia, general manager of the Keystone State Telephone and Telegraph Company, chairman of the reception committee, took charge of the delegates as they arrived. Other members of the reception committee were:

Willard P. Beardsley, of Harrisburg, district superintendent of the United Telephone and Telegraph Company; W. H. Wilson, of Erie, general manager of the Union Telephone and Telegraph Company; Cameron L. Baer, of Harrisburg, manager of the local office of the United Telephone and Telegraph Company, and W. H. Denlinger, of Patton, president of the Huntingdon and Clearfield Telephone Company.

When the old executive committee met on Tuesday morning the following committeemen were selected, being announced and ratified at the organization meeting that evening:

Nominations—Edward Davis, of Philadelphia; A. F. Moses, of York; E. D. Schade, of Johnstown; John M. Core, of Uniontown, and S. G. Latta, of St. Mary's.

By-Laws and Constitution—Robert E. Flinn, of Pittsburg; J. P. Conley, of Cresson, and C. E. Wilson, of Philadelphia.

Program—F. D. Houck, of Philadelphia; O. S. Marshall, of Rural Valley, and H. E. Bradley, of Philadelphia.

Toasts—W. D. Barnard, of Philadelphia; J. G. Splane, of Pittsburg, and C. E. Wilson.

Secretary Bradley was enthusiastic over the response to the invitations scattered throughout the State and said emphatically to the correspondent for the AMERICAN TELEPHONE JOURNAL that the meeting was more of a success than the promoters had anticipated.

Hon. Vance C. McCormick, the reform Mayor of Harrisburg, welcomed the telephone men to the Capital. He took occasion to speak of the entrance into the city of better and cheaper telephonic service through the lines of the Independent people. When a member of the city councils of Harrisburg, he said, he had the honor of supporting an ordinance granting a franchise to an Independent telephone company. It was this franchise which, while briging money into Harrisburg's city treasury, also brought the improved and cheapened service in the telephone business.

W. H. Denlinger, of Clearfield, responded to the Mayor's address of welcome in appropriate terms and briefly explained the objects of the association. He declared that Independent telephony had come to stay and that while it had already conferred inestimable benefits upon the public by establishing telephone lines where none existed before, by cheapening the cost of telephonic communication to the user and by greatly improving the service, organization of the various telephone companies for thorough inter-communication will confer still greater benefits upon the people and enable the companies to extend and improve their lines.

James B. Hoge, of Cleveland, O., spoke of the pleasure which it gave him to extend to the Pennsylvania State Independent Telephone Association greetings from the National Independent Telephone Association of America. "You enjoy the distinction of holding the first convention to organize along the line planned at the St. Louis convention last week," he continued.

Mr. Hoge then told of the success of that convention and followed with a detailed account of its doings, a full story of which has already been printed in the THE AMERICAN TELEPHONE JOURNAL.

Mr. Hoge emphasized the good results to be obtained from dividing a State into districts. This action was taken last June in Ohio, when the State association was reorganized. A number of small Independent companies were found which had never affiliated with the State body.

There are two classes of membership in the association—active and associate. The first receives officers or directors of any Independent telephone company included in the scope set forth in the by-laws, the annual fee being $10. The second receives any one connected with an Independent telephone company, the member paying an annual fee of $1 and having all privileges except the ballot. By special arrangements a subscription to THE AMERICAN TELEPHONE JOURNAL goes with each membership.

A. L. Têtu, of Louisville, Ky., was particularly outspoken in the effect upon the telephone business of the National Independent Association when the several States had been well organized and could co-operate thoroughly with the National body.

Pennsylvania, he said, being the first to organize along the lines of the St. Louis plan, the lead must be followed in other States. Then the National body will ultimately become the weapon of offense and defense for which the leading Independent hope.

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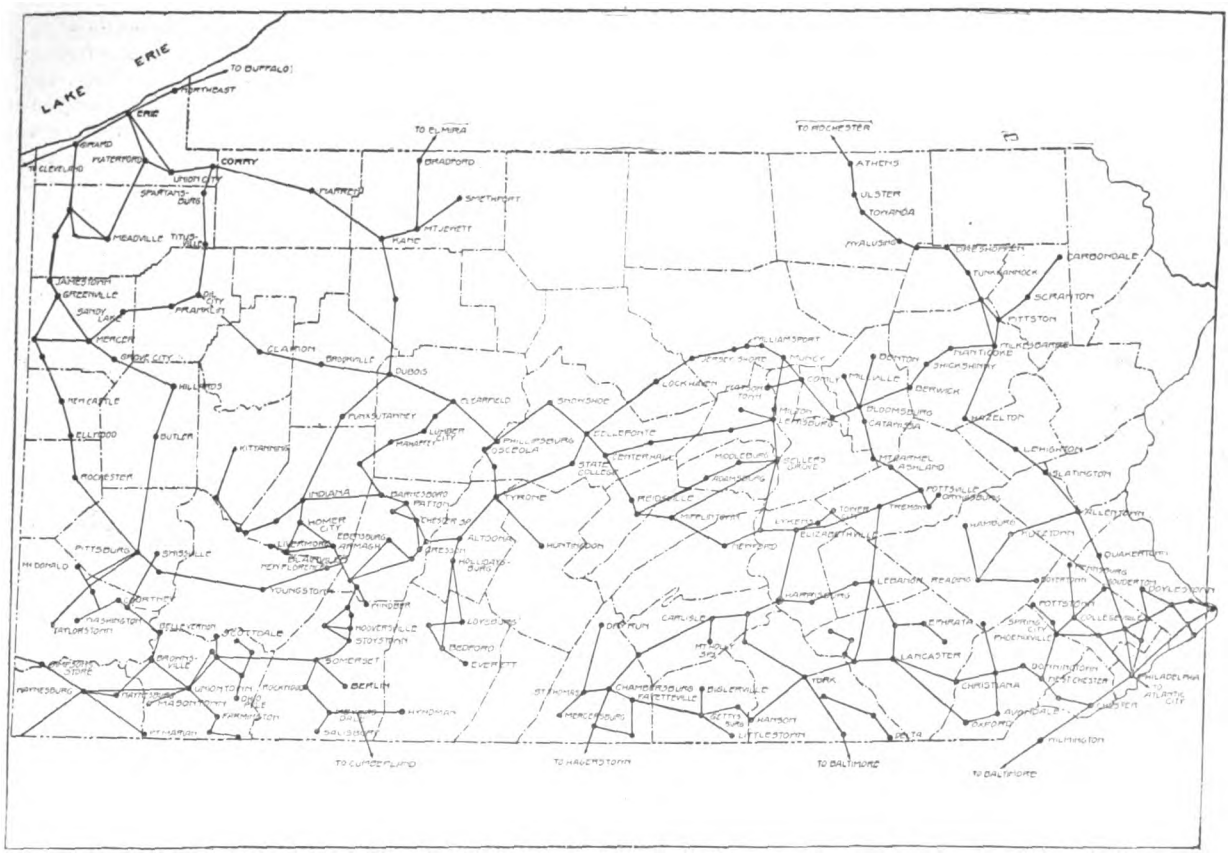
Secretary Bradley said that an important provision in the by-laws, which in the main are similar to those suggested at St. Louis, was that officers or employees of telephone lines operating in contiguous territory could become members of the Pennsylvania association. This extends the field to including New York, New Jersey, Delaware, Maryland, Virginia or West Virginia, if desired. The provision was made in order to extend a helping hand to States like New Jersey, Delaware, Maryland or West Virginia, where it is thought the Independent lines are not sufficiently strong to maintain a separate State association at the start.

I. D. Gindhart, Jr., of Philadelphia, was introduced and made an address to the convention upon "Telephone Auditing." Mr. Gindhart's speech, together with those by Mr. C. E. Wilson, general manager of the Keystone Telephone Company, of Philadelphia, Charles Russell, of Philadelphia, and Mr. H. E. Bradley, secretary of the association, will be published in the next issue of THE JOURNAL.

In 1895 the Bell people had in their employ practically every one who knew anything about telephony. They had all the patents. The Independent people had to make men to make their machines. In nine short years the number of Independent telephones has grown to more than 2,400,000—ten times as many as the Bell system had from '77 to '95. To-day the Bell system embraces about 1,250,000 telephones, but in the annual reports of the company one telephone is counted as two—the receiver and the transmitter each being counted as a single telephone.

No business, Mr. Critchfield went on to say, is so absolutely certain of profit for the investor as the telephone. The business is not affected by hard times, for the telephone is one of the last things to be dispensed with. A man will have one or two less radiators, or consume a little less coal or burn a few less lights in order to keep his telephone. He cannot do without it; it is a necessity as a money saver.


LAKE ERIE
TO BUFFALO
ERIE
TO ELMIRA
TO ROCHESTER
CLEVELAND
CONNEAUT
UNION CITY
SPARTANSBURG
CORRY
WARREN
BRADFORD
SMETHPORT
MT JEWETT
MEADVILLE
TITUSVILLE
JAMESTOWN
GREENVILLE
SANDY LAKE
FRANKLIN
MERCER
GREAT CITY
NEW CASTLE
BUTLER
KITTANNING
ROCHESTER
PITTSBURG
MCDONALD
SMITHFIELD
YOUNGSTOWN
WASHINGTON
TAYLORSTOWN
WELLSVILLE
STEUBENVILLE
WHEELING
MARTINS FERRY
BARNESVILLE
CAMBRIDGE
ZANESVILLE
CLARION
BROOKVILLE
PUNXSUTAWNEY
CLEARFIELD
DUBOIS
PHILIPSBURG
OSCEOLA
LUMBER CITY
RIDGWAY
SHOMOKIN
KANE
ATHENS
ULSTER
TOWANDA
MALVERN
SHIPPENSBURG
CARBONDALE
TUNKHANNOCK
SCRANTON
PITTSTON
WILLIAMSPORT
MUNCY
DANVILLE
MILTON
LEWISBURG
BLOOMSBURG
CATAWISSA
BERWICK
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in organizing the Independent telephone companies and because these men would not dare to ask their neighbors to buy what they themselves would not buy there is $125 dollars of value for every $100 invested in the Independent companies.

To-day it is impossible to meet the demand for telephones and three long-distance calls are registered for every letter bearing a 2-cent postage stamp which is carried by the United States mail. The people cannot wait for the telegraph and the mail.

Treasurer Hall, of the Pittsburg and Allegheny lines, emphatically declared the paying qualities of the Independent lines to be a business which has proven its ability to pay from 3½ to 5½ per cent. interest.

Quoting Franklin, he said all of the companies must hang together or they will hang separately. The Independents, disorganized, are up against organization all over the country, but we are bringing them to centralization. The experience of nine years has proven that we are not on a false basis; it is one of utility; it is one of firmness; it is one of growth.

Wipe out the Independent telephones of the country to-day, Mr. Hall said, in concluding, and the business machinery would stop. The Bell lines could not handle the trade.

A. L. Têtu, of Louisville, Ky., general manager of the Louisville Home Telephone Company and the Independent Long Distance Telephone and Telegraph Company, was introduced when the members had quieted down after vigorously applauding Mr. Hall.

Mr. Têtu said that for two years the Independents have been in Louisville. When the exchange was established there the number of telephones in the city numbered 2,000; now there are 14,000, the Independents having 1,000 more of them than the Bell.

Mr. Têtu's remarks were brief and confined chiefly to the fights by the Independent companies since he left the Bell several years ago. He attributes the success in Louisville to the fact that the interests are localized.

The toastmaster concluded by introducing Former Governor William M. Bunn, of Philadelphia.

Mr. Bunn's address was confined principally to Philadelphia, he being inordinately proud of the Keystone State and its Eastern metropolis, and the work being done in that part of the State furnished the basis for the eulogy of the city.

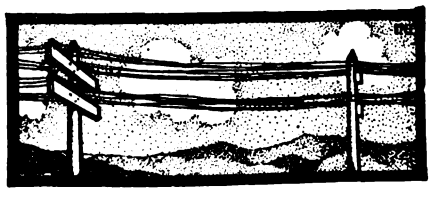
J. B. Hoge, of Cleveland; J. B. Ware, of Detroit, and Captain William Thompson, of Philadelphia, all spoke briefly.

Major Lewis E. Beitler, deputy secretary of the Commonwealth of Pennsylvania, was the last speaker. The Major's popularity was quickly shown as his tall form loomed up above the height reached by any previous speaker, and he was immediately presented with a potted pine tree about twelve feet high. Major Beitler said it reminded him of the proverbial "plum tree."

He complimented the Independent telephone association and expressed the greatest satisfaction with its service. This service, he said, is much better than that given by the Bell companies.

QUERIES

Questions on any subject relating to telephony will be answered on this page.



INDUCTION COIL DESIGN.—(432.)

Fig. 888 represents an induction coil. *C* is a rolled condenser six inches long. *A* and *A* represent an iron core wound around *C*. Primary and secondary are then wound around *A*, *B* and *B'* are terminals of *C*. *B* goes to *P* and *B'* to *S*.

In reference to the merits of the induction coil, which you describe in your letter of recent date, it would appear that a rolled condenser, such as you describe occupying the center of the coil,

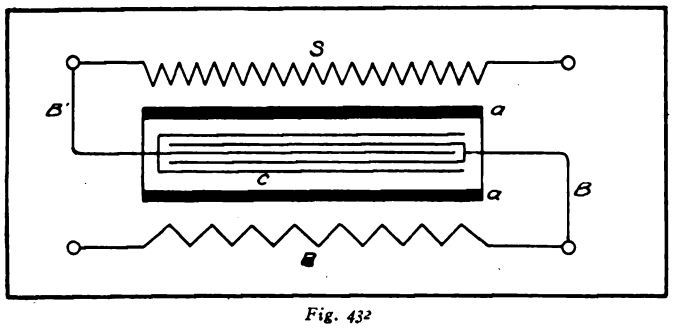


Fig. 432

would require considerable space. That is to say, would be from an inch to an inch and a half in diameter, depending upon the capacity of the condenser. It would then be necessary to wind the induction coil upon the outside of this condenser and consequently the turns of the coil would be long as a result. Either the wire must be very large or else the coil would possess an undesirable resistance, and in any event the wire would be much longer than would be required, by a coil of a regular core. Thus the cost of the coil would be increased either by the use of larger wire or by the use of longer wire or both, and as there are no advantages, we should consider this form of coil undesirable.

GUYING POLES.—(433.)

Will you please illustrate the correct method of guying poles by means of a guy pole? L. M. G.

The correct method of guying poles is dependent entirely upon the conditions which exist at the point of the line where a guy wire is necessary. It is therefore evident that under certain conditions different methods are necessary. The only object to be gained in using a guy stub is to raise the guy wire. The general method used is illustrated in Fig. 433, in which *B* is the more correct position of the stub. Where the pole placed as at *A* and the guy anchor gives way, the pole which it is intended to pro-

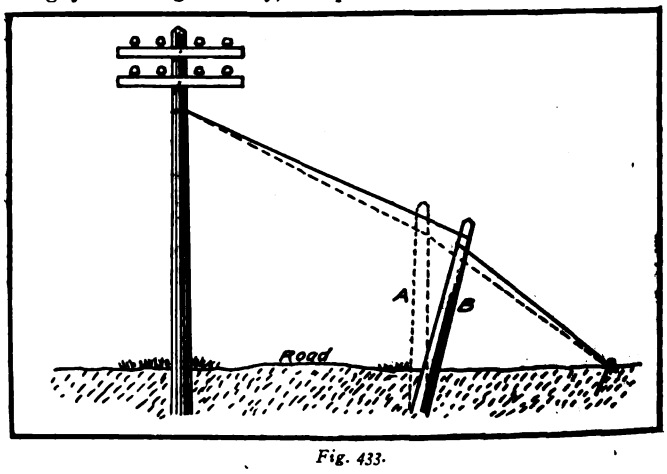


Fig. 433.

tect would pull the guy stub over and possibly out of the ground, whereas if the stub is in the position *B* there is a larger amount of compression upon it due to its position, and it is therefore able to aid the anchor by offering a greater opposition to the strain of the guy wire than it could were it in the position as shown at *A*.

TRANSPOSITION.—(434.)

Kindly advise me if you can furnish me with blue prints of transpositions of different types. I refer to specifications such as are used by long distance toll companies. Also advise me where I can get them if you cannot furnish them. W. W. L.

IN our previous issue we published two diagrams of transpositions for six and ten pin arms. A full set of instructions for transpositions is published in Mr. A. V. Abbott's book upon Telephony, Volume IV, to which we would refer you for further information.

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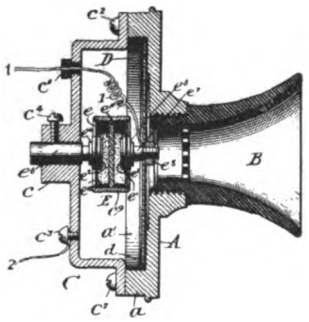
TELEPHONE PATENTS

TELEPHONE TRANSMITTER.

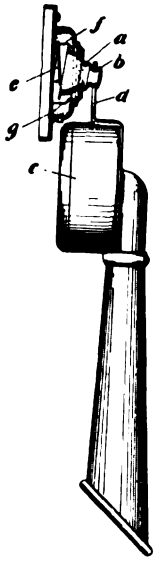
J. W. Lattig, of West Bethlehem, Pa., and C. L. Goodrum, of Philadelphia, Pa., patent (No. 769,702) a telephone transmitter and assign to the Eastern Telephone Manufacturing Company, of West Chester, Pa. This invention relates to granular telephone transmitters and has for its object improvements which will enable a more powerful high resistance transmitter to be constructed. The inventors provide a face plate *A*, to which the mouthpiece *B* is attached. The bridge *C* is secured in the usual manner across the face plate. The rear electrode *e2* is carried upon a stem *e6*



secured in a bearing upon the bridge by means of the screw *c4*. The front electrode *e3* is carried upon the stem *e8* secured in the usual manner. A capsule containing the granular carbon is suspended upon the two electrodes by means of two flexible mica diaphragms which cover its ends. In the center the capsule is divided into two parts by means of a diaphragm *e11*. By this means the effects are secured similar to those of a double button transmitter.

AN IMPROVED HOOK-SWITCH.

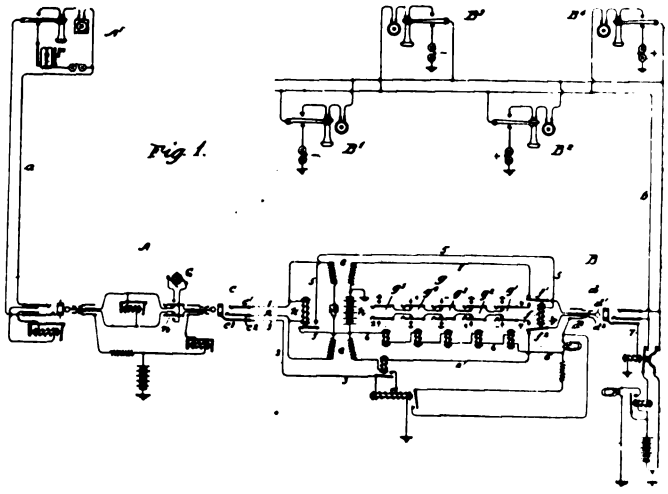
W. A. Hjorth, of Stockholm, Sweden, patents (No. 769,084) and assigns to Elektromilitara Aktiebolaget, of Stockholm, Sweden, an improved hook-switch. The object of this invention is to provide an improved switching device to take the place of the ordi-



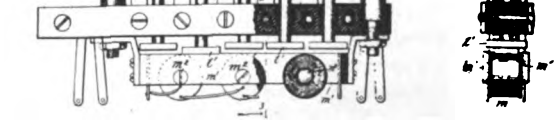
nary hook-switch in substation apparatus. As is shown in the accompanying illustration, the inventor provides an oscillating button, *A*, having a projecting knob, *B*, upon which the transmitter may be supported by means of a hook. The oscillating knob, *A*, operates a contact spring, *B*. When the transmitter is hung upon the button, the knob rolls in its socket and operates the contact.

RINGING ON TRUNK LINES.

J. L. McQuarrie, of Chicago, Ill., patents an improved trunk line circuit (No. 769,763) and assigns to the Western Electric Company of Chicago. The intention of this invention is to provide a switchboard circuit whereby the answering operator can ring a subscriber in a distant office over a trunk line. The



essential features of the ringing key are shown in Figs. 2 and 3, while the switchboard circuit is shown in Fig. 1. As is shown in Figs. 2 and 3, the inventor provides a key having a number of plungers, each of which when depressed is locked in place by means of an electromagnet, and by the springs *g2* in Fig. 3 connects the line with such a particular kind of ringing current as is adapted to signal the party desired. The system is best understood by describing its operation. When an answering operator at the *A* board (*A*, Fig. 1) desires a connection with a line which terminates in a distant office at the *B* board, she inserts the calling plug into the trunk line jack *c* and orders the connection over an order wire in the customary manner. The operator at the *B* board inserts the plug *d* into the jack of the desired line and de-



presses one of the plungers *g1*, *g2*, *g3*, *g4* or *g5*, as may be adapted to call the particular party. The *A* operator then manipulates the ringing key *n*. This sends ringing current over the trunk line and through the relay *k*, which closes the contact *5* of the local circuit operating the electromagnetic switch *f* and thus connects the ringing current to the called line. As the plunger of the ringing key is held in position by the magnet *m* (Figs. 2 and 3), the key cannot be set until the plug is inserted in the called line, but after its insertion the plunger remains depressed and the ringing current applied until the subscriber has removed the receiver from the hook.

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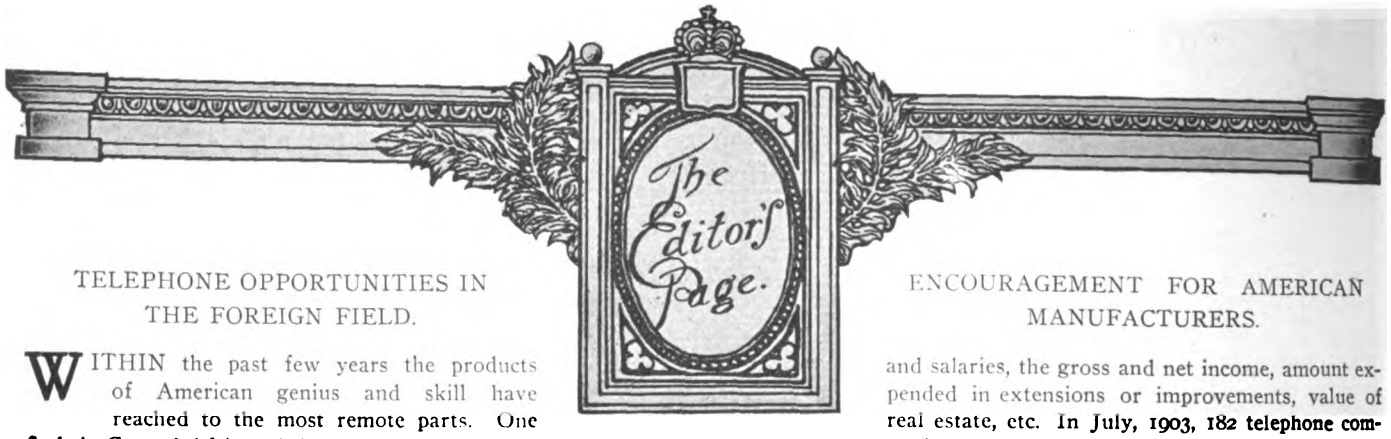

TELEPHONE OPPORTUNITIES IN THE FOREIGN FIELD.

WITHIN the past few years the products of American genius and skill have reached to the most remote parts. One finds in Central Africa a bridge made and installed by an American firm. In the back country of Australia the sheep herders live in galvanized iron bungalows imported from the States and out in the South Pacific seas the natives use hunting goods which bear the trade marks of some New England factory.

In telephony the United States is pre-eminently the leader, and with few exceptions the apparatus of the world is copied from American models. This being the case, it would seem that the telephone manufacturers should be able to supply a major part of the large amount of apparatus which is now being secured in Europe and other parts of the world.

In the August Consular Report the United States Consul at Leipzig, Germany, stated that the Guatamalan Government contemplated considerable extensions to its telegraph and telephone systems and the Consul-General at Frankfort, Germany, reported that the Spanish Government was about to establish telephone systems in seven Spanish cities. Sartaro Oi, in his paper presented to the recent International Electrical Congress, estimated the opportunities for American telephone apparatus in Japan.

Quite recently a contract was placed by the Compania Telephonica do Estado de S. Paulo, of San Paulo, Brazil, with the International Telephone Manufacturing Company, of Chicago, for a 4,000-line capacity self-restoring drop generator-call multiple switchboard. The present equipment calls for the immediate operation of 1,500 lines, built in five three-position architectural iron sections and including a complete power plant, storage battery set, power switchboard, together with main and intermediate distributing rack, lightning arrester and sneak current protectors, all complete, ready for installing.

The board to be furnished will be equipped with the latest type self-restoring drops, with pilot lamps, proper busy tests, etc. The investigation that led up to this contract was made for the telephone company by Eduardo de Aguiar D'Andrada, chief electrical engineer of the S. Paulo Railway Company, and Edgard de Souza, chief electrical engineer of the S. P. T. Light and Power Company.

This apparatus is for replacing and greatly enlarging the company's present system, the plant to be extended to cover the entire city of S. Paulo, which at the present time has a population of nearly 100,000 inhabitants.

Here is an illustration of what the American manufacturer may look for in the South American telephone field. There are scores of cities down there as active as any communities in the world almost, and not one of them should be equipped with apparatus that hails from any country except the United States.

TAXING TELEPHONE COMPANIES IN INDIANA.

INDIANA has one of the best tax laws of any State in the Union and provides that telephone companies file a report in July of each year with the State Tax Board, which holds a six weeks' session to value these properties and equalize the taxation or rate levied by local tax officers. These reports are required to show the mileage of wire, number of miles of poles, number of poles per mile, kind of wire, kind of poles, how long in use, size, etc., number of switchboards, number of telephones in use, number of employees and officials, amount paid for wages and salaries, the gross and net income, amount expended in extensions or improvements, value of real estate, etc. In July, 1903, 182 telephone companies reported to the tax board, and in July, 1904, 252, a gain of 70 companies for the year. In 1903 there were 125,536 miles of telephone wire strung in Indiana and in 1904, 146,212 miles, a gain of 20,676 miles during the year.

In 1903 there were 77,278 miles of wire strung in Indiana by the allied Bell companies and 47,258 miles owned by the Independent companies. In 1904 the allied Bell companies had increased their mileage to 83,026 and the Independent companies to 63,186, the gain of the Independent companies being nearly three times that of the Bell companies.

The tax board fixed the assessments on the telephone companies about the same as last year, with the exception of the Central Union Telephone Company, whose assessment was reduced from $56 to $54 per mile. This was done on the strength of the "poor month" story related to the board by its legal representative to the effect that the company's lines and poles were old, much of the equipment antiquated, fixed charges heavy and the opposition in localities destructive.

ENCOURAGEMENT FOR AMERICAN MANUFACTURERS.

CONTRACT AGAINST PUBLIC POLICY.

ACTION or damages was brought by J. B. Gwynn against Citizens' Telephone Company of South Carolina. The plaintiff alleged that he had demanded from the telephone company the use of the Citizens' telephone in his store and that the defendant company willfully refused him the use of the telephone, unless he would consent to a prohibition against the joint use of the telephone of the Southern Bell Telephone & Telegraph Company. He refused to consent to this prohibition. The defendant denied the allegations of negligence and willfulness and gave as an excuse that at the time the demand was made upon it by the plaintiff, its switchboard and lines were so crowded and there were so many demands upon it that he could not comply with the plaintiff's request.

The defendant also set up as a counter claim the breach by the plaintiff, prior to the demand upon which the plaintiff was sued, of a written contract by which the plaintiff agreed to use the telephone exclusively in his place of business, the defendant alleging that the plaintiff used another telephone and refused to comply with the terms of the contract. The plaintiff moved to strike out the allegations of the answer, on the ground of insufficiency. The trial judge permitted the allegations set up as a defense, but sustained the demand of the counterclaim. The plaintiff received a verdict for $400.

The Supreme Court held that the counterclaim was connected with the subject matter of the action, as it was the foundation upon which the defendant based his refusal, but allowed the plaintiff the further use of the telephone. The court held, however, that the contract alleged in the counter claim was void on the ground that it was in restraint of trade and against public policy. The modern doctrine is that contracts between individuals are not void, on the ground that they are in restraint of trade, unless the provisions thereof are unreasonable. The contract alleged in the counter claim was unreasonable, because its tendency was to stifle competition between carriers and to create a monopoly in favor of the defendant. The Supreme Court therefore refused the judgment of the Circuit Court, and remanded the case.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CROSSING RAILROAD RIGHT OF WAY.

High Point, N. C.

Several months ago in building a copper toll line, we crossed and placed two poles on railroad right-of-way which is 200 feet in width. The railroad company is now trying to make us sign contract with them in which we are to move the poles off their right-of-way, use insulated wire and at a height of 33 feet and to remove the line entirely whenever called upon. Is this a fair contract? Can railroad company remove our line or prevent us from crossing?

THE railroad company can remove your line and prevent you from crossing, just as a private individual can. However, you have the right to secure a passage across their right-of-way by condemnation proceedings in case of inability to reach an amicable understanding. The fairness of the contract depends largely upon local conditions, but it seems that the use of insulated wire and the stringing of the wires at the height of 33 feet above the ground are fair provisions, made necessary by the railroad company's duty to protect its employees. In case you should have to resort to condemnation proceedings it would be cheaper for you not to set the poles upon the railroad company's right-of-way if you can cross it without so doing, because you would be compelled to pay damages to the amount of the value of the land actually occupied by the poles, and not that lying under the wires. St. Louis & C. R. Co. vs. Postal Teleg. Co., 173 Ill., 508; 51 N. E., 382. The provisions of the contract requiring you to remove your line entirely whenever called upon seems too advantageous to the railroad company if a permanent removal was meant. If, however, the provisions were draughted so that you are only to move the line temporarily when necessary, it would not be unreasonable.

MISS BREWER BEAT TELEPHONE CO.

TO prevent the New England Telephone Co. from putting a pole in front of her house, Miss Emilia F. Brewer, of Stockbridge, Mass., who will be 70 years old in three weeks, and who is a sister of Associate Justice David Josiah Brewer of the United States Supreme Court, sat in a hole 18 inches deep all one afternoon and during the night slept in a tent over the hole. Her dinner and supper were brought out to her by a maid. During the afternoon, by order of the Stockbridge selectmen, a deputy sheriff carried Miss Brewer bodily to the house and just as he reached the front door she broke away and sat down in the hole again. During all of the afternoon the selectmen tried to get her to give up; leading cottagers of the town called upon Miss Brewer, extended their sympathy, and said they hoped she would defeat the telephone company. Miss Brewer won her case against the New England Telephone Company, the selectmen of Stockbridge, and Egbert Yale, one of the wealthiest and best-known citizens of the town. The selectmen and Mr. Yale gave their consent to have the pole located just across the road from Miss Brewer's estate, and she ended her vigil. For 44 years Miss Emilia Brewer has been a teacher. She was in South Africa for six years; for 17 years she was an instructor for the mountain whites of northern Alabama, and for a number of years she was on the plains of Kansas and Nebraska. For the past two years Miss Brewer has been an instructor for the blind at the Industrial Home for the Blind in Hartford, Conn.

KNOWLEDGE OF DANGEROUS CONDITION.

WHERE an electric company negligently fails to insulate its wires so that an adjacent fallen telephone wire becomes charged with a deadly current and causes death, the electric company is liable, without regard to its actual knowledge of the fallen wire, for its diligence in discovering it. This was the holding of the Supreme Court of South Carolina in an action brought against the Charleston Consolidated Railway, Gas & Electric Company and the Gordon Telephone Company for causing a person's death. The plaintiff alleged that her intestate's death was caused by coming in contact with the wire of the telephone company which had fallen across the electric company's wire and was highly charged with electricity. The liability of the telephone company was not involved in the appeal. The electric company demurred to the complaint and appealed from an order overruling the demurrer.

The ground of the demurrer was that it was not alleged in the complaint that the electric company had knowledge of the fact that one of the telephone company's wires had broken and fallen across one of its own wires, or that sufficient length of time had elapsed for the breaking and falling of said wire to have been discovered by the electric company by due diligence or proper care. The court sustained the order overruling the demurrer, holding that the extent to which the wires conveying deadly electric currents should be insulated or otherwise guarded, must be decided by the jury under the facts of each case. In determining the danger it is the duty of those in control to have in view all the surroundings, including the contiguity of the wires, the liability to fall, and the coming in contact with dangerously charged wires. "Hence, when the plaintiff states that the discharge of the fatal current from the electric company's heavily charged wire through the telephone wire was due to the defective and negligent insulation, a good cause of action is stated." Parsons vs. Charleston Consol. Ry., Gas & Elec. Co., (S. Carolina) 48 S. E. 284.

ANOTHER CASE INVOLVING KNOWLEDGE OF DANGEROUS CONDITION.

IN another case involving a telephone company the Supreme Court of South Carolina held that knowledge of the dangerous condition, which in this case was the obstruction of a highway by telephone wires, was an important element in determining the defendant's liability. A little girl, by her guardian ad litem, sued the owner of the telephone line for negligently allowing a telephone wire to sag across the highway and remain in such condition for ten days. The plaintiff, accompanied by her mother, passed along the highway, driving in a top buggy, and without any fault on her part, the wire caught the top of the buggy in which she was riding, turned it over and threw her to the ground, inflicting upon her severe bodily injury. The defendant secured a verdict and, the plaintiff appealing, the decision of the lower court was reversed. One of the reasons alleged by the plaintiff for revision of the judgment was the refusal of the judge to charge that the question of notice to the owner of the line, as to its condition, could not be considered by the jury. On this point the court held that the request to charge was properly refused. The difference between the holding of the court in this case and in the one previously mentioned is caused by the different state of facts.

The court also decided that where the plaintiff states all the facts necessary to make out a cause of action, it need not refer to the statute nor set out its terms. It is a question of law for the court, and not one of fact for the jury, whether a person is required by statute to remove an obstruction from a highway. In an action under the statute to recover damages for obstructing a highway, recovery does not depend upon negligence; but for obstructions not forbidden by statute, it is encumbent upon the plaintiff to show that she not only suffered injury which was caused by defendant, but that such injury was the result of negligence. Smith vs. Gilreath, (S. C.) 48 S. E. 262.

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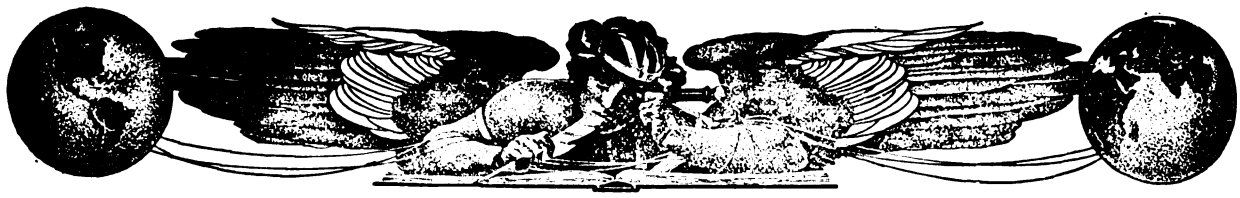

IN THE OPERATING FIELD.

SOUTHERN INDIANA INDEPENDENT TELEPHONE ASSOCIATION.

THE fifth annual meeting of the Southern Indiana Independent Telephone Association was held at Rockport on September 26th and 27th. The attendance was fairly good and the interest manifested was greater than at any previous meeting. It was the intention to hold an afternoon session on the first day, but owing to the late arrival of President C. D. Knoefel, of New Albany, the regular programme was not taken up until the night session. The afternoon was spent in making up the enrollment and looking over the large and interesting displays of the supply companies.

The evening session was held in the court-house, where a general discussion was had of the "Needs of Independent Telephone Companies in Southern Indiana" and how to bring about a better toll line service between the local exchanges. It was argued that greater harmony should prevail and a more determined disposition to effect universal co-operation in the extension of the service. During this discussion experiences were exchanged and numerous plans suggested for the betterment of the service throughout the southern half of the State. The delegates and visitors were next escorted to the city hall, where an elaborate banquet was held. The banquet had been planned as the culminating feature of the notable meetings held by the Southern Indiana Association. The committee of arrangements had devoted great care and attention to the details, and the result fully justified it all. The after-dinner speaking began most happily and continued throughout the evening. A. J. Payton, manager of the Home Telephone Company, of Spencer County, acted as toastmaster. H. J. Cole, of Owensboro, was the first speaker of the evening, his subject being "Our Guests." Other subjects and speakers were as follows: "What Shall the Harvest Be," by H. Landgrebe, of Huntingburg; "The German Language on the Telephone," by Frank Beaucound, manager New Albany Home Exchange; "How Should the Telephone Be Managed," by J. L. Arthur, Indianapolis; "The Supply Men," by F. M. Thorn; "Telephone Finance," by C. D. Knvefel, president Southern Indiana Telephone Company, of New Albany. The speeches were all listened to with interest and profit, as it was evident that several of the speakers had made considerable preparation. It was shown that the telephone business is being handled in a much more practical and satisfactory manner than a few years ago.

The morning and final session of the second day was devoted to miscellaneous business. Owing to the fact that many of the Independent companies have been merged and consolidated the attendance throughout was not as good as formerly. The election of officers resulted in the re-election of Charles D. Knoefel, of New Albany, president, and E. W. Landgrebe, of Huntingburg, secretary

THE NEW UNION TELEPHONE COMPANY OF ERIE.

THE Union Telephone Company of Erie, Pa., which was recently formed to conduct a long distance telephone system, has acquired the system of the Union Telephone & Telegraph Company, which comprised several exchanges and 600 miles of toll lines, by purchase at a recent meeting.

The new company has under its management about twenty exchanges, with nearly 4,000 telephones, and about 600 miles of pole lines connecting with the city of Pittsburg on the south, and Cleveland on the west, and very soon will have connections with Buffalo on the east. It reaches as far east as Riply, N. Y.; also Bradord, Pa., and Olean, N. Y. It also has lines from Erie to Kane and reaches all principal points in Elk county. The lines also run from Bradford to Kane.

Lines are run through Union, Corry and Warren to Kane, having connection with all the Independent exchanges in these towns, and also to Girard and Conneaut, connecting with lines to Ashtabula and Cleveland. From Girard they run south and go through Linesville, Jamestown, Sharon and New Castle and on to Ellwood City, where they connect with the Pittsburg lines, and from Corry to Titusville, where they connect with the Petroleum exchange, giving service to Oil City, Franklin, Sharon and New Castle.

The company is at present busily engaged in putting up $30,000 worth of No. 10 copper wire, which when completed will give unexcelled communication with not only Pittsburg and Cleveland, but very shortly with Buffalo.

P. & A.'S CONNECTION WITH WEELING DELAYED.

VARIOUS difficulties have prevented the Pittsburgh & Allegheny Telephone Company and the National Telephone Company of Wheeling from completing the connections between the two cities as soon as was expected. It is probable November 1 will see the line in operation. It will add 3,000 telephones at Wheeling to the list reached by the Pittsburg Independent company.

The new line is being built from Bridgeville straight toward Wheeling on a private right of way, making the distance about fifty-eight miles from Pittsburg.

The connection at Wheeling not only gives the list of 3,000 in that company's directory, but gives further connections in West Virginia and Ohio, which makes the additional telephones connected total 10,000.

NEWARK TELEPHONE COMPANY DECLARES A DIVIDEND.

AT the last regular monthly meeting of the Newark (Ohio) Telephone Company it was voted that a quarterly dividend of one per cent. be declared to holders of the company's common stock. The regular semi-annual dividend of three per cent. will be paid on the preferred stock on the first of January.

The Newark Telephone Company has opened up its new toll line to Gratiot, which exchange already gives service to a large number of subscribers at Gratiot, Brownsville, Mount Perry, Linnville, Mount Sterling and White Cottage. All of these telephones have been installed during the past two months.

These telephones are connected with the central exchange at Gratiot and are there switched on to the lines of the Newark Company.

With this connection the new company now gives toll service to every village and almost every cross road in the country, and also over 1,700 telephones in Newark and Granville.

HOME COMPANY OF CARTHAGE, MO., MAKES TRAFFIC AGREEMENT.

THE Home Telephone Company of Carthage, Mo., has entered into a contract with the Red Oak, Meinert & Lockwood Telephone Company, a mutual company, covering the northeast section of the county, for traffic purposes. The main switchboard is located at Maple Grove. There are about one hun-

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dred farmers in that vicinity who will be given free connection with Carthage. The company will build a new line in a northeasterly direction to accommodate rural subscribers to Carthage exchange. It is expected that the line will be in operation in the next sixty days.

Carthage subscribers to the Home Telephone Company have over 700 connections in the town and something like 2,300 to 2,400 outside; besides the Home Telephone Company can furnish connections with Kansas City and St. Louis and intermediate points.

POPULARIZING THE TELEPHONE.

IT has remained for Independent telephone companies to popularize the use of the telephone. That they have succeeded in an admirable manner is certain from the large number of subscribers to their systems. This result is due in a great measure to the methods of advertising employed to secure publicty. A case in point which demonstrates clearly what is wanted is here-

Theatre Telephone Service of The Evening Telegraph Information Bureau

CALL UP KEYSTONE—MAIN 1800—IF

—You want to know what attraction plays in a certain house a certain week.
—You want seats engaged for a given performance.
—You want to know what plays your favorite actors and actresses are to appear in this season.
—You want to know prices of seats in any theatre for any performance.
—You want a diagrammatic description of seats concerning which the numbered location is in doubt.
—You want to know where and when any theatrical attraction is opening the season.
In short, if you want ANY sort of information about ANYTHING theatrical,

CALL UP KEYSTONE—MAIN 1800

with shown. The Keystone Telephone Company has furnished numerous ideas which are well worth consideration by all Independent companies, and this idea of advertising theatre service is not the least of these. To the theater-going public it will be a boon and will at the same time fix firmly in the minds of the people who are interested, the great value of an up-to-date Independent system.

DISSATISFACTION WITH CUMBERLAND IN TENNESSEE.

THERE is dissatisfaction and complaint over the actions of the Cumberland Telephone & Telegraph Company among subscribers at Ashland City, Tenn. When the exchange was put in about four months ago, in order to get a sufficient number of subscribers to justify the establishing of the system, the contracts entered into with the subscribers provided that communication should be had with all points in this county where there is a telephone, without extra charge to the subscriber. This was to be allowed even when the calls had to go through the Nashville and Clarksville exchanges, but now it is proposed by the company to cut out those places in the county which have to be reached through Nashville and Clarksville, and charge the subscribers the regular tolls for this service.

DECORATIONS AT BANQUET OF PENNSYLVANIA ASSOCIATION.

THE decorations at the banquet of the Pennsylvania State Telephone Association convention at Harrisburg, Pa., which evoked expressions of admiration on all sides, were peculiarly applicable to a telephone dinner.

Stationed immediately before the stage in the auditorium of the Harrisburg Board of Trade Building was a circular table, a dozen feet in diameter, the toastmaster's table. Resting upon this was an exact reproduction, on an enlarged scale, of a desk telephone set, worked in flowers and smilax. .

Flanking the toastmaster's table to right and left, were two large tables, extending to either side of the hall. Taking the center table with its desk set as an imaginary exchange, complete sections of a telephone line in miniature radiated along the flanking tables. Everything about these line sections was on a scale of about one-fifth.

The poles were swathed in moss and smilax. The cross-arms, one to each eight poles, bore seven small incandescent electric lights, representing the insulators. These lights were pointed upward, the larger ends being frosted. The reflected light glistened from copper wire, new coils having been taken from stock to heighten the artistic effect.

This unique idea, as well as the general scheme of decoration, was evolved by Willard P. Beardsley, of Harrisburg, district superintendent of the United Telephone and Telegraph Company, who was given *carte blanche* by the executive committee. The work was done under Mr. Beardsley's direction by a corps of men from the Harrisburg United office, superintended by Granville S. Herbert, wire chief.

A copy of the coat-of-arms of Pennsylvania was suspended at the rear of the stage, an orchestra being placed directly in front, entirely concealed by a bank of potted plants, among the branches of which dozens of small green incandescent lights glimmered.

Cut flowers stood about in dozens of vases and a carnation boutonniere reposed at each place. Each guest received as a souvenir a miniature telephone receiver, one and one-quarter inches long, pendant from a ring for use as a watch charm. Miniature switchboard plugs of the same length were distributed also. The menu cards were of deep blue, cut in keystone shape, bearing a cut of a desk set, with the occasion and date upon the front cover.

INDEPENDENT LONG DISTANCE LINES.

EVERY effort is being made to complete connections by means of long distance toll lines between the Independent systems of the Central States at the earliest possible moment. Quite recently a long distance line was built from Richmond, Ind., to Dayton, Ohio, and lines are now being rapidly pushed forward to connect the system in Ohio and Indiana with Kansas City and other towns in the Southwest. Indianapolis and St. Louis are already connected and extensions are being built that will connect the companies in Pennsylvania, Maryland, New Jersey, and New York with the vast system of Independent lines which are rapidly forming a network over the whole country.

CONGRESS PAPERS.

MEMBERS of the International Electric Congress of St. Louis can receive copies of any Congress paper, or papers, in which they are interested, and which were printed in advance, by applying to Mr. H. H. Humphrey, Electrical Engineer, Chemical Building, St. Louis, Mo. Mr. Humphrey has kindly promised to distribute these papers on application until October 10th. We are also informed that written communications by way of discussions from congress members upon any Congress paper will be received by the general secretary, Dr. A. E. Kennelly, Harvard University, Cambridge, Mass., up to October 15th.

CUYAHOGA TO INTRODUCE STREET TELEPHONES.

THE Cuyahoga Telephone Company is considering the advisability of establishing public telephones upon the streets. As a test the company recently made application to the board of public service for permission to put up two telephones—one at the corner of Euclid and Bolton avenues and the other at the corner of Euclid and Sterling avenues.

The plan of the company is, if the permit is granted, and they prove successful, to operate a large number of public telephones in this manner. They will be the same as pay stations, except that they will not occupy the usual room of a pay station. They will be attached to posts, and in this way take up no more room than an ordinary telephone pole. The first two will be merely to see how the public takes to them, and if they will be of any public convenience, aside from the profits that might be derived.

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TELEPHONE TESTS

By Dr. A. E. Kennelly.

Editor's Note: Dr. Kennelly's paper upon "Telephone Tests" was one of the most unique of the contributions to the Electrical Congress. It was original in describing a new apparatus for making telephone tests. In the past, telephonists have often been at a loss to devise methods of inspecting switchboards and other parts of a telephone plant. Dr. Kennelly's application of the barretter opens an entirely new field and one which from present appearances likely to be of much value.

The following appendices to Dr. Kennelly's paper are reproduced because they form an integral part thereof and because it is difficult and almost impossible to fully grasp the entire scope of the paper in their absence. While they are somewhat formidable mathematically, Dr. Kennelly has the happy faculty of writing mathematics so clearly, that with a little study these appendices may be readily comprehended.

APPENDIX I.

Theory of the Method of Measuring Alternating-Current Strengths by the Change of Barretter-Resistance to Direct Current.

Using the c.g.s. system for simplicity, and the connections of Fig. 6.

Let r = the resistance of the barretter b, when heated by the steady testing current (absohms).

$\triangle r$ = the small increase in the resistance r due to the superposition of the feeble alternating current.

I = the strength of the steady direct testing current (absamperes).

i = the effective or square-root-mean-square strength of the superposed alternating current (absamperes).

p = the power dissipated by the barretter b when traversed by the steady testing current (abswatts).

p = the small increase in power dissipated when the alternating current is superposed.

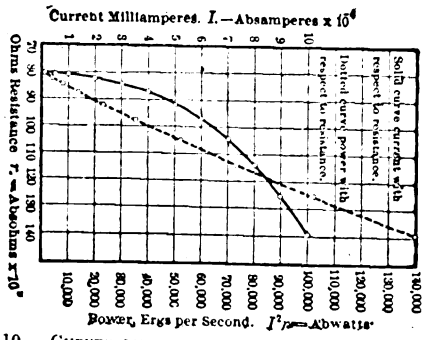

Fig. 10.— Curves showing relation between the resistance r, of a particular 1.7 μ barretter, the current strength, I, steadily flowing through the barretter; and the power I^2r dissipated in the barretter.

Then $p = I^2r$ abwatts.

$p + \triangle p = (I^2 + i^2)(r + \triangle r)$ "

$= (I^2 + i^2)(r + \frac{\triangle r}{\triangle p}\triangle p)$ "

$= (I^2 + i^2)(r + \frac{dr}{dp}\triangle p)$ when $\triangle r$ is very small "

$\therefore \triangle p = (I^2 + i^2)\frac{dr}{dp}\triangle p + i^2 r$ "

$\therefore \triangle p \left\{ 1 - (I^2 + i^2)\frac{dr}{dp} \right\} = i^2 r$ "

But $\triangle p = \frac{dp}{dr}\triangle r$ " " "

$\therefore \frac{dp}{dr}\left\{ 1 - (I^2 + i^2)\frac{dr}{dp} \right\}\triangle r = i^2 r$ "

$\left\{ \frac{dp}{dr} - (I^2 + i^2) \right\}\triangle r = i^2 r$ "

$i^2 = \frac{\triangle r}{r}\left\{ \frac{dp}{dr} - (I^2 + i^2) \right\}$ (absampere)²

By actual measurement it is found that in all cases p follows nearly a straight line with respect to r, see Fig. 10, and, at least within the range of r considered, $\frac{dp}{dr}$ becomes a constant for each particular barretter. Thus in Fig. 10, and near 10 milliamperes or $I = 10^{-3}$, $\frac{dp}{dr} = 2700$ ergs per ohm $= 2.7\times10^{-6}$ abwatts per absohm.

Let $\frac{dp}{dr} = b$ an approximate constant, which may be called the dissipation-resistance constant.

Then $i^2 = \frac{\triangle r}{r}\left\{ b - (I^2 + i^2) \right\}$

and $i = \sqrt{\frac{\triangle r}{r}}\sqrt{b - (I^2 + i^2)}$ absamperes.

Thus in the case of Fig. 10 for $i < 2$ milliamperes,

$$i = \sqrt{\frac{\triangle r}{r}}\sqrt{2.7\times10^{-6} - 10^{-6}}$$

$$= \sqrt{\frac{\triangle r}{r}}\sqrt{1.7\times10^{-6}}$$

$$= \sqrt{\frac{\triangle r}{r}}\ 1.304\times10^{-3}$$

For $\frac{\triangle r}{r} = 0.01$ or 1 per cent $\sqrt{\frac{\triangle r}{r}} = 10^{-1}$

$i = 1.304\times10^{-4}$ absamperes.

$= 1.304$ milliamperes.

Thus if $\sqrt{b - I^2} = c$ the barretter-constant,

then $i = \sqrt{\frac{\triangle r}{r}}\times c$ absamperes

$= \sqrt{\frac{\triangle r}{r}}\times c^1$ milliamperes

where $c^1 = c\times10^4$.

Or the alternating-current strength in milliamperes will be a constant times the square root of the proportionate increase in barretter resistance due thereto.

The sensibility of the method, or the minimum current which can be measured, depends upon the minimum proportionate increase in resistance $\triangle r/r$ that can be determined, and upon the magnitude of $b = \frac{dp}{dr}$ the dissipation per unit increase of resistance; also, in lesser degree, upon the strength I of the testing current.

When the barretter of Fig. 10 was sealed within an exhausted glass vessel, the testing current I was reduced to 1.5 milliamperes, or 1.5×10^{-4} absamperes and b to 90 ergs per ohm $= 9\times10^{-8}$ abwatts per absohm. From these values $c = 2.6\times10^{-4}$

$$i = \sqrt{\frac{\triangle r}{r}}\times2.6\times10^{-4}$$ absamperes.

If the least determinable change in resistance is 1/7000 of 1 per cent;

then $i = \sqrt{\frac{1}{700{,}000}}\times2.6\times10^{-4} = 3.1\times10^{-7}$ absampere

$= 3.1$ microamperes.

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APPENDIX II.

Theory of Determining the Proportionate Increase in Resistance of a Barretter (and Hence the Alternating-current-strength) by a Milliammeter in Direct Series Circuit as in Fig. 5.

Let r = the res: of the barretter under steady test (absohms).
R = the res: of the barretter circuit steady test (absohms).
e = the e.m.f. of the dry cell (abvolts).
I = the steady testing current (absamperes).

Then
$$I = \frac{e}{R}$$
$$\frac{dI}{dr} = -\frac{e}{R^2} = -\frac{I}{R}$$
$$\therefore \frac{dI}{I} = -\frac{dr}{R}$$
$$\therefore \frac{\Delta I}{I} = -\frac{\Delta r}{R} \text{ when } \Delta r \text{ and } \Delta I \text{ are small}$$
$$\text{or } -\frac{\Delta I}{I} = \frac{\Delta r}{r} \times \frac{r}{R}.$$

The proportionate change in current as indicated by the milliammeter will be less than the proportionate charge in barretter by resistance in the ratio r/R

$$\therefore \frac{\Delta r}{r} = -\frac{\Delta I}{I} \times \frac{R}{r}.$$

In order to make the minimum $\triangle\frac{r}{r}$ observable, the resistance of the barretter should be as large a proportion as possible of the resistance of the circuit.

If $\frac{R}{r} = d$ a constant of the circuit
$$\frac{\Delta r}{r} = -\frac{\Delta I}{I} \times d.$$

By observing the proportionate diminution of current $-\frac{\Delta I}{I}$, the proportionate increase in resistance is thus deducible.

Theory of the Universal Shunt with Alternating Currents.

Referring to Fig. 6, let R be a constant non-inductive resistance constantly connected to the barretter b and condenser c. Let Z be the vector impedance of the condenser at the particular frequency or association of frequencies employed, absohms, $\angle$. Then the multiplying power of the shunt R permamently applied is

$$N = \frac{R+z+r}{R} \quad \text{(vector)}.$$

If now the contact t is shifted from f along R to some position distant electrically nR from a; then
$$N' = \frac{R+z+r}{nR}$$
$$= \frac{N}{n}.$$

If n be taken as $^1/_2$, $^1/_3$, $^1/_4$ etc.,
$$N' = 2N,\ 3N,\ 4N, \text{ etc.}$$

Consequently it is unnecessary to know the impedance Z offered by the condenser. It is sufficient to maintain the resistance R constantly connected, to calibrate the apparatus under this condition, and then obtain desired shunt by bringing out a contact-position at the corresponding point of the resistance R. The only drawback is the permanent reduction in sensitiveness of the apparatus by the constant shunting of the resistance R, even when the contact t is connected at f. If, however, $R = 2000$; while $(z+r) = 200 \angle 53°$

$$N = \frac{2126 \angle 4°.19'}{2000} = 1.063 \angle 4°.19'$$

so that the permanent loss of sensibility is only 6.3 per cent.

With the universal shunt applied, the formula for the instrument becomes

$$i = n N d c' \sqrt{\frac{\Delta I}{I}} \quad \text{milliamperes}$$
$$= nK\sqrt{\Delta I} \quad \text{milliamperes}$$

where n is the multiplying power of the universal shunt, K is the constant of the instrument with the full shunt R applied and the testing current I; while $\triangle I$ is the small diminution in testing current-strength (as read off in scale-divisions) due to the action of the alternating current.

APPENDIX III.

SERIES OF PRACTICAL TESTS WITH THE APPARATUS.

Since the paper was written, the engineering department of the American Telephone & Telegraph Company has made a series of tests with the apparatus from day to day, on a loop of open-wire circuit from Boston to Bedford, N. Y., and return, with a view to ascertaining the variations which might occur in repeating the received-current test on the same circuit day after day under conditions kept as nearly the same as possible. Owing to the fact that no high-frequency alternator has been available of sufficiently good regulation to afford a constant impressed voltage from day to day, the impressed voltage at the sending end had to be observed simultaneously with the current at the receiving end. The observations are tabulated below. It will be seen that the receiving-end impedance varied from 10,600 ohms to 13,000 ohms, being affected apparently by the insulation of the circuit.

TABLE I.

Date.	Impressed voltage.	Barreter number.	Insulation of circuit megohm-miles.	Shunt multiplier.	Deflection.	Receiving end impedance ohms
July 22	33.85	7	6.67	1.25	2.0	12,500
22	33.85	9	6.67	1.25	1.9	13,100
26	30.78	7	9.85	1.25	1.8	12,300
26	30.78	9	9.85	1.25	1.6	13,000
27	30.78	7	8.58	1.25	1.9	11,900
27	30.78	9	8.53	1.25	1.7	12,600
28	30.78	7	5.14	1.25	1.8	12,300
28	30.78	9	5.14	1.25	1.7	12,600
29	30.78	7	13.26	1.25	1.8	12,300
29	30.78	9	13.26	1.25	1.7	12,600
August 5	30.16	7	8.98	1.25	1.7	12,300
5	30.16	9	8.98	1.25	1.6	13,000
8	29.54	7	5.43	1.25	1.7	12,100
8	29.54	9	5.43	1.25	1.7	12,100
10	30.78	7	2.35	1.25	1.8	12,300
10	30.78	9	2.35	1.25	1.7	12,600
11	30.16	7	8.58	1.25	2.0	11,400
11	30.16	9	8.53	1.25	1.7	12,300
12	30.78	7	6.93	1.25	2.0	11,600
12	30.78	9	6.93	1.25	1.9	11,900
14	30.78	7	0.63	1.25	2.4	10,600
14	30.78	9	0.63	1.25	2.1	11,300
17	33.94	7	12.08	1.25	2.1	12,300
17	33.94	9	12.08	1.25	2.0	12,500

Circuit tests of loop of 384 miles of two No. 12 N. B. S. G. copper overhead wires (plus underground wires in Boston city limits). Resistance per loop mile, 10.5 ohms. Capacity per loop mile, 0.008 microfarad. Inductance per loop mile, 3.66 millihenrys. Insulation as above. Frequency about 300.

TELEPHONE SYSTEM FOR TROLLEY ROADS.

CONCTRACTS have been let by the Auburn & Syracuse (New York) Electric Railroad Company whereby a telephone system will be installed which will enable cars at any point on the line to communicate directly with headquarters at Auburn or Syracuse or any station along the line.

The company already has a telephone line between the two cities. Considerable difficulty was experienced last winter in locating cars which were in trouble along the line because the telephone system was not in use, and it is expected that all this will be obviated when the line is complete.

Each car operated on the line will have a portable telephone. By use of a jack plug connections can be made with the telephone system and conductors can telephone to any point on the line. Cars will be dispatched and receive orders by this system also.

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THE WEEK'S MESSAGES

FINANCIAL.

COLLEGE CORNER, IND.—The Home Telephone Company of College Corner has increased its capital stock from $4,000 to $25,000. The company proposes to install new equipment and extend its lines.

DECATUR, IND.—The Citizens' Telephone Company of Decatur has increased its capital stock from $6,000 to $60,000. Extensive improvements will be made, new equipments installed including a new and up-to-date switchboard.

DES MOINES, IA.—The Boone County Telephone Company has given a mortgage for $50,000 to J. H. Herman as trustee to secure 5 per cent. bond issue to that amount.

MARION, WIS.—J. W. Hockenberger and Louis Goldberg, of Marion, representing the Marion & Northern Telephone Company, were in Shawano recently endeavoring to interest the citizens of that place in subscribing to a telephone system which their company proposes to install at Shawano. Statement is made of the investment of $1200 worth of stock by business men of Shawano would insure the construction of the system.

FRANCHISES.

SANTA MONICA, CAL.—A petition for a franchise for telephone and telegraph service in Santa Monica has been presented by Lewis Blakenhorn, representing the Home Telephone Company.

FULLERTON, CAL.—The city trustees have granted the Home Telephone Company permission to install a toll station in this city provided it agrees to connect with any new company that may install a local system.

MANITOU, COLO.—M. H. Spere and associates have been granted a 20-year franchise by the Local City Council to construct and operate an Independent telephone system. Articles of incorporation have been drawn up for the new company, placing the capital stock at $500,000.

HIGHSTOWN, N. J.—The Councilmen have agreed to grant the Farmers' Telephone Company a franchise providing it shall be so amended as to make the construction not less than $1500.

MIAMISBURG, OHIO.—The village council at a recent meeting granted a franchise to the Montgomery County Telephone Company.

SALEM, ORE.—W. D. D'Varney has presented a petition to the city council asking for a franchise to install a telephone system in Salem.

DALLAS, TEX.—F. B. McElroy and others have petitioned the city council for a franchise to construct and operate an Independent telephone system in Dallas for a period of twenty years. They offer a bonus of not less than $50,000 during the life of the franchise.

ELECTIONS.

NORTHVILLE, MICH.—The Northville Telephone Company has re-elected the old officers and directors. The reports submitted by the officers show the company to be in a prosperous condition, with 168 telephones in operation.

HANNIBAL, MO.—At a meeting of the Bluff City Telephone Company the following officers were elected: J. F. Davidson, president; T. G. Dulany, vice-president; H. C. Conger, secretary and general manager, and J. P. Hinton, treasurer.

JONESVILLE, N. Y.—The Clifton Park Telephone Company held its annual meeting and elected the following officers: Erastus R. Foote, of Jonesville, President; Norman Van Vranken, of Vischer's Ferry, secretary, and George Losee, of Elnora, treasurer.

HARRISBURG, PA.—At the recent convention of the Independent Telephone Association of Pennsylvania the following officers were elected: B. F. Meyers, Harrisburg, president; A. E. Flinn, Pittsburg, vice-president; C. Griffith, Johnstown, second vice-president; H. E. Bradley, Philadelphia, secretary; C. E. Wilson, Philadelphia, treasurer. The executive committee is as follows: B. F. Meyers, C. W. Kline, C. E. Wilson, J. G. Splane, R. E. Umbel, A. D. Barnard, E. D. Schade, W. B. Trask, and G. B. Rudy.

NEW COMPANY NOTES.

RIVERSIDE, CAL.—The Home Telephone Company has been granted a franchise to construct and operate a telephone line between Riverside and north county limits. The company is already laying the underground conduit system in Riverside for its local exchange.

COCOA, FLA.—The Brevard County Telephone Company has been organized with a capital stock of $5,000 to build and operate a telephone line from Cocoa and Eau Gallie; from Cocoa to Titusville, and to Courtnay at Merritt Island and south to Tropic. The incorporators are: H. S. Williams, Joseph Paxton, G. S. Hardee, S. S. Jones and R. W. Andrews.

ESTHERVILLE, IA.—The Emmett County Telephone Company has been organized and at the next election the company will put its proposition for a franchise before the voters of the city. The company is composed of local business men and intends to construct a local telephone system with numberless lines running into the country.

RAYMOND, ME.—The Raymond and Webbs Mills Telephone Company, of Raymond, has been incorporated with a capital stock of $10,000. The officers are: F. W. Plummer, president, and G. H. Hall, treasurer, both of Raymond.

BALTIMORE, MD.—The Holmes Electric Protective Company has been incorporated with a capital stock of $100,000 to conduct a telephone business. The incorporators are: Edward T. Holmes and Robert A. C. Smith, of New York; Henry P. Wilcox, H. K. McCabe and Charles T. Crane, of Baltimore.

PRINCESS ANNE, ME.—The Manoker Telephone Company has been incorporated with a capital stock of $5,000 by R. R. Hoyt, A. B. Fitzgerald, J. P. Muir, W. L. Muir, I. T. Parks, and G. W. Broyman.

LINCOLN, NEB.—The Central Nebraska Toll Line Company has been incorporated with a capital stock of $100,000. The officers are: Commander N. Beaver, president; Herman Behling, vice-president; C. H. Kolling, treasurer, and J. M. Bell, secretary.

KERNERSVILLE, N. C.—The Kernersville Telephone Company has been incorporated ith a capital stock of $5,000 by W. C. Linville, G. V. Fulp, M. V. Fulp and A. N. Linville, of Kernersville, and F. W. Lubert, of Waterbury, Conn.

CASTLETON CORNERS, S. I., N. Y.—The Castleton Corners Telephone Company has been organized here with the following officers: Maurice H. Gescheidt, president and general manager; Charles C. Wickert, secretary and treasurer; Charles C. Schmidt, chief engineer.

STERLING, N. Y.—The Sterling Telephone Company has been incorporated with a capital stock of $960.

RICE, O.—Farmers in this vicinity held a meeting recently for the purpose of organizing an Independent telephone company to construct and operate a rural and local telephone system. The organization will be completed in the near future.

BUTLER, PA.—The People's Telephone Company has been reorganized with a capital stock of $50,000. The officers are: John Younkins, president; M. Henshaw, secretary; T. Shuffin, treasurer. The directors are the officers and John V. Ritts and A. L. Rieber.

HARRISBURG, PA.—The Sullivan County Telephone Company has been incorporated here with a capital stock of $5,000 in 200 shares at $25 each. The directors are: Ulysses Bird and J. E. Bird, of Forksville; Fred Newell, George Streby and Peter J. Yonkin, of Dushore; George W. Lambert, of Overton, and Olan J. Williams, of Shunk. The company will erect and operate lines in Sullivan, Bradford, Wyoming and Lycoming countries, with headquarters at Dushore. The points to be connected are: Canton, Bradford County; Forksville, Hillsgrove, Dushore, Ricketts and Laporte, Sullivan County; Towanda and Wyalusing, Tunkhannock and Williamsport. George Streby, of Dushore, is treasurer.

MANSFIELD, S. DAK.—Farmers living in the vicinity of Mansfield have organized a Farmers' Telephone Company to construct a rural telephone line from that place. The officers of the company are: John Harrington, president; George Woodford, secretary; Charles Granger, treasurer.

LONGVIEW, TEX.—The Lacey Telephone Company, of Longview, has been incorporated with a capital stock of $5,000 by J. C. Lacey, Edwin Lacey and J. E. Yates, of Longview, and Jasper Collins, of Carthage.

COMBINATIONS.

IMPERIAL, CAL.—W. F. Holt has sold his telephone system at this place to the Arizona Consolidated Telephone & Telegraph Company for $15,000.

INDEPENDENCE, MO.—J. S. Haley, of Independence, has sold the telephone exchange at Warrensburg and Knobnoster and the connecting toll lines to the Kinloch Telephone Company, of St. Louis, for $65,000.

KANSAS CITY, MO.—The stock and lines of the Western Independent Telephone Co. have been transferred to the Kansas City Home Telephone Co. This is merely a consolidation of the working parts of the outside lines with the business of the Home Company, for the two companies were owned and operated together prior to the consolidation. The Western Independent Telephone Co. was organized to construct and operate toll lines throughout the West, connecting the various Independent exchanges with each other and Kansas City.

TILTON, N. H.—The Citizens' Telephone Company will construct a line to Northfield Center and from that place to Canterbury, connecting with the Canterbury line.

TABLE ROCK, NEB.—W. A. Conklin and others have purchased the telephone lines owned by W. C. Felliss, Ben Heer, the State Bank and G. E. Decker.

MOUSTON, WIS.—The Mouston Electric Light and Power Company and the Mouston Telephone Company have been sold to a party of business men of this city. The name has been changed to the Mouston Electric Service Company. The officers are: P. D. Curran, president; A. Rasig, secretary; William Case, vice-president; S. Bassford, treasurer, and G. J. Thew, electrician.

MISCELLANEOUS.

CHICAGO, ILL.—As rapidly as the change can be brought about, the management of the Burlington has decided to substitute the telephone for the telegraph in dispatching and operating both passenger and freight trains.

FALL CREEK, ILL.—The headquarters of the Adams-Pike Counties and Hannibal Telephone Company is at Fall Creek, Ill., instead of Quincy, as stated in a recent issue.

PEORIA, ILL.—The Interstate Independent Telephone and Telegraph Company will construct a new exchange building to cost $30,000. The building will be three stories in height and the telephone company will require most of the space to house its equipment properly. The basement will be used as a storeroom, to which purpose also the 71 feet in the rear of the first floor will be devoted. The second floor will contain the cable-room and power plant, the wire chief's office, in which testing machines are installed, a lunchroom for the operators, and the local offices of the company. The third floor will be entirely given over to the accommodation of a switchboard.

WABASH, IND.—The city officials have brought suit to enforce the removal of the poles and wires of the Central Union Telephone Company. The old franchise of the company expired a year ago and the new franchise offered was declined by the company. The city holds that a new franchise is necessary to continue business and proposes to remove the company's property from the streets.

BUFFALO LAKE, MINN.—The Stewart Electric Telephone Company's rural line running north from Buffalo Lake was considerably damaged by the recent cyclone. Many of the poles were lifted from the holes and one telephone was destroyed in a residence.

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ERSKINE, MINN.—In a recent fire in this city the telephone exchange was totally destroyed.

HUTCHINSON, MINN.—The Hutchinson Telephone Crew were camped for supper when struck by the cyclone, which passed through this section of the country. Their wagon, tents and other paraphernalia were demolished and the men were covered with mud and badly pounded. The cook was found under the stove and other cooking utensils. Amount of damage was about $400 on the rural lines. The Central Minnesota had three miles of lines torn down between Hutchinson and Glencoe.

MANKATO, MINN.—The Citizens' Telephone Company, of Mankato, started six years ago with 250 subscribers and at present has 800 subscribers, 125 miles of toll lines and 125 miles of rural lines and connections with a dozen farmer lines. Have built a trunk copper line from Worthington to the Twin Cities; this line will connect at Worthington with the Sioux Falls line, now being erected to Yankton, Mitchell and Sioux cities.

MINNEAPOLIS, MINN.—The telephone companies in the Twin Cities were hard hit by the cyclone that passed through that section recently. Miles of poles and lines were blown down in the city limits of both St. Paul and Minneapolis and thousands of "drop" lines are out of commission.

RICHMOND, MO.—Parties interested in the organization of the Mutual Telephone Company, of Ray County, Mo., held a meeting recently at Richmond and decided to organize on October 1st.

ST. JOSEPH, MO.—J. S. Newell, president of the Citizens' Telephone Company, and Jesse S. Funston, president of the Funston Telephone Company, both deny the report that their companies have been absorbed by the Gould system. The Citizens' company is a local Independent company and the Funston company is building a line to Chillicothe and thence to Kansas City and from Hamilton, Mo., to points in Iowa.

EDGERLY, N. D.—C. J. Sturgeon has put in a 150 drop switchboard in the local telephone exchange.

HARRISBURG, PA.—Highway Commissioner J. Austin Brandt has served notice to companies maintaining poles upon the streets of Harrisburg that they must be painted, lettered and numbered within sixty days. This action is taken because it is frequently difficult to locate the owner of a pole when it is desired for any cause to move it. The name or initials of the company, together with the number of the pole, must now be placed on each. The timbers must be painted from ground to tip. Telephone companies affected are the United Telephone and Telegraph Company and the Pennsylvania Telephone Company (Bell).

HOMESTEAD, PA.—The P. A. Telephone Company has installed a duplicate system in conjunction with its exchange in this city whereby it is possible to signal a party in the usual manner if the automatic fails to operate.

NEW BOSTON, TEX.—The New Boston Telephone Company has advertised its exchange for sale.

UNDERGROUND.

DIXON, ILL.—The Lee County Telephone Company is laying an underground conduit system in this city.

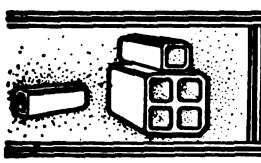
PERSONAL.

M. W. MITCHELL, of Wilkesbarre, Pa., has been appointed manager of the Cleburne, Tex., telephone exchange, vice Vanwormer, resigned. He is now in charge.

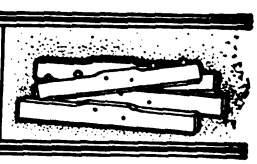
J. W. ORCHARD, of Nashville, has been appointed manager of the East Tennessee Telephone Company's exchange at Morristown.

J. G. SIGLER has accepted the position of manager of the Kinloch Telephone Company's exchange at St. Charles, Mo. The former manager, George P. Player, who has been appointed wire chief of the company's long-distance service, will be located in St. Louis.

E. C. STARKS has resigned the management of the Wood County Telephone Company at Grand Rapids Mich., to take charge of the Northern Rural Telephone Company's system at Spencer, Wis.



New Construction in the Field



DECATUR, ALA.—The Morgan County Telephone Company has built a line to Trinity and will extend it on to Memphis, where it will have connections with the principal cities east of the Mississippi River.

ETNA, CAL.—An assessment of large proportions has been levied on the stock of the Siskiyou Telephone Company for the purpose of putting the line in better condition. A metallic circuit will be put in from Yreka through Scott Valley to Salmon River and back.

SUMMERLAND, CAL.—The Home Telephone Company is pushing the construction work of its system so as to get it in service as soon as possible.

ALTON, ILL.—H. G. Bassett has secured the contract to build two miles of the Fosterburg-Upper Alton telephone line into the Burg.

BUFFALO HART, ILL.—The Williamsville Telephone Company is busy constructing their line from here to Dawson.

CHICAGO, ILL.—The Lake Shore & New York Central recently completed its telephone system from Chicago to New York.

SPRINGFIELD, ILL.—The Pana and Christian County Telephone Company is erecting a new lead cable in connection with its system.

SOUTH WHITLEY, IND.—The Farmers' Mutual Telephone Company is moving its exchange to larger quarters and will install about 1,500 feet of conduit.

CRESTON, IA.—The Mutual Telephone Company has extended its line to Macksburg.

MILL CREEK, KY.—The Elmwood Place Business Men's Club contemplates constructing an Independent telephone company to furnish local telephone service to Mill Creek business men. Elmwood business men have volunteered to back the new concern if the contracts for the village fire-alarm service can be secured as a source of revenue. Several hundred subscribers are promised.

NEW IBERIA, LA.—The People's Independent Telephone Company has recently reconstructed its lines in this city and is increasing its switchboard capacity on account of increasing demand for telephone service both in the city and country. The Independent business is increasing in Louisiana.

SHERMAN, ME.—Milliken, Wren & Porter are building a telephone line from Sherman to Island Falls. They claim they have over 100 subscribers and many new ones expected. They expect to build to Smyrna Mills this fall and in the spring to Kingman.

COTTONWOOD, MINN.—The Home Telephone Company has secured a sufficient number of patrons to warrant the construction of three rural telephone lines.

GLENCOE, MINN.—The Minnesota Central Telephone Company is rebuilding its long-distance line from Glencoe to Hutchinson and from Glencoe to Renville. It is also stringing a copper metallic circuit over the entire line, making three metallic circuits between Glencoe and Renville.

HENNING, MINN.—The telephone line is extending its copper line from here to Deer Creek.

DASSEL, MINN.—The Dassel & Collinwood Telephone Company will construct a system in Central Collinwood.

OWATONNA, MINN.—The lines of the Merton Rural Telephone Company which were completed recently are about twenty-five miles in length and extend through Owatonna, Merton, Medford and Clinton Falls townships.

THIEF RIVER FALLS, MINN.—The line to Scotland and Germantown will soon be completed.

KANSAS CITY, MO.—The Home will at once begin the extension of its long-distance lines in Nebraska and will improve its service in Kansas and Missouri. By the terms of its agreement with the Kinloch company the territory of Missouri has been divided, the northeast and southeast being apportioned to the Kinloch company and the northwest and southwest to the Home company. The Kinloch company has also agreed to keep out of Kansas. The Home company is in an excellent position to build up one of the largest Independent systems in the country.

DIXON, NEB.—A rural telephone line will be constructed from this place out into the country for the accommodation of farmers.

BINGHAMTON, N. Y.—The York State Telephone Company has recently completed its lines to Elmira after two years' hard work. The delay was caused by the opposition of property owners to right of way.

FULTON, N. Y.—The Fulton Telephone Company will install a new switchboard.

HARTWICK, N. Y.—The Hartwick Independent Telephone Company has extended its lines to Oneonta and Cooperstown via West Oneonta, Laurens, Mount Vision, South Hartwick and Fly Creek.

NEW LISBON, N. Y.—The New Lisbon Telephone Company is stringing wire from here to Edmeston and will connect with the West Winfield line, also giving communication with Burlington Flats, Exeter.

FINLEY, N. D.—The Union Telephone Company will put in a local exchange.

GREENVILLE, O.—The Greenville Home Telephone Company has nearly completed its new line to Fort Jefferson and other points in the southwestern part of the county.

KENTON, O.—The Kenton Telephone Company is planning to purchase property in this city on which it will construct a new exchange building.

TIFFIN, O.—The Tiffin Home Telephone Company has installed a new switchboard of 1,200 lines installed with ultimate capacity of 3,000.

PINE, ORE.—The telephone line from here to Homestead will be completed in a short time.

HARRISBURG, PA.—The directors of the United Telephone and Telegraph Company at a meeting held here recently made an appropriation for rebuilding the plant at Littlestown and a line from Gettysburg to Littlestown.

EL PASO, TEX.—The Colorado Telephone Company now operates long-distance lines in the Las Vegas and it is announced that this company will extend its line as far south as Socorro touching Santa Fe, Albuquerque, Cerillos, Belen and other points. The company will also extend its line to Las Cruces and get connection with El Paso.

MEADVILLE, PA.—The Meadville Telephone Company has closed a contract to build a line between Meadville and Cochranton. When this line is completed it will give the Meadville company a through copper circuit to Pittsburg and will also give them direct connection with Franklin, Oil City and Titusville. The contract calls for the completion of the line in sixty days.

OGDEN, UTAH.—The Utah Independent Telephone Company will connect Ogden and Salt Lake City. It has already put up its switchboard.

SUFFOLK, VA.—The Nansemond Telephone Company is rapidly extending its system and building toll lines into surrounding countries.

BRIDGEPORRT, W. VA.—The Belmont Telephone Company will establish an exchange and will install a local system of telephones in Bethesda at once. Lines will be built into the surrounding territory.

FAYETTEVILLE, W. VA.—The Wyoming Development and Telephone Company has just completed a telephone line from Oceana, the county seat of Wyoming, to Hallsville, in this county, a distance of twenty-two miles. This line touches Bailesville and Toney's Fork, and at Hallsville connects with the Welch Williamson Telephone Company's lines, enabling the people throughout the entire territory traversed by the latter company and the Bluefield Telephone Company to talk to Oceana and intermediate points.

ANTIGO, WIS.—The work on the telephone line is progressing rapidly.

APPLETON, WIS.—The Fox River Valley Telephone Company has completed its new line to Hortonville. It is the intention of the company to run other lines through the country as fast as they can be constructed.

LA CROSSE, WIS.—The line of the Tri-State Telephone Company has reached La Crosse and connections have been made, thus giving La Crosse communication over it to Minneapolis and all points in the northwest. The large cable across the Mississippi River has been finished and the line is practically done.

WEBLAKE, WIS.—A telephone line will be constructed from Swiss to Spooner by way of Weblake.

PRETORIA, TRANSVAAL, S. A.—It is rumored that $65,000 will be expended in the installation of an up-to-date telephone system in the city of Pretoria, Transvaal, South Africa.

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TRADE NOTES.

THE F. BISSELL COMPANY, of Toledo, Ohio, has recently issued several circulars and price lists of the various pieces of apparatus it manufactures.

THE MONARCH TELEPHONE MFG. CO., of Chicago, Ill., reports unusual activity in all branches of its establishment. Several large orders have recently been filled for complete equipment.

THE VOUGHT-BERGER COMPANY, of La Crosse, Wis., wishes to call the attention of the exchange manager to the twenty-four exclusive advantages claimed for the Pendant telephone. To those interested the company will be pleased to enumerate them.

THE INTERNATIONAL TELEPHONE MFG. CO., of Chicago, has recently secured a large order for switchboard equipment to be used in extensions to a telephone system in San Paulo, Brazil, consisting of a 4,000-line capacity 1500 equipped self-restoring drop switchboard.

THE BAIRD MANUFACTURING CO., of Chicago, reports that it has received two large orders from old customers for pay-station apparatus which not only proves that its machines are giving complete satisfaction but that they are proving a most profitable feature of their customers' business.

THE AMERICAN ELECTRIC TELEPHONE CO., of Chicago, reports among recent shipments of switchboards the following equipments: Albion, Neb., 100-line switchboard; Osage, Ia., 500-line switchboard; Louisville, Neb., one 100-line switchboard; Plattsburg, Mo., 100-line switchboard; Hopkins, Mo., 200-line switchboard.

S. H. COUCH CO., of Boston, states in a neat blotter just issued: "We are now prepared to furnish our No. 12 telephone and other common return intercommunicating telephones wired for our central battery system B12. This system is non-interfering in that all of the circuits may be in use simultaneously and parties on one circuit not be disturbed by the conversation of parties on another circuit."

THE W. G. NAGEL ELECTRIC COMPANY is exploiting the Polk Safety Cut-in Knob. By the use of this porcelain insulator telephone cmpanies are not compelled to tie in their drop wires where duplex is used. It not only secures quickly, but permanently. The wires can be run in from any direction with absolute safety. It is believed that telephone companies will find this insulator to be a time-saver as well as a money-saver.

HUBBARD AND CO., of Pittsburg, Pa., reports that its factory, which was recently destroyed by fire, has been entirely rebuilt and much enlarged. All the most up-to-date tools and apparatus have been installed, which will add toward securing the best results in manufacture of the articles that are made. This company is one of the largest in this country or in the world for the manufacture of shovels and similar tools. The company will be pleased to furnish catalogues and prices upon request.

THE ELECTRIC STORAGE BATTERY COMPANY, of Philadelphia, has issued a very neat memorandum book relative to storage batteries. The book is handsomely bound in celluloid and of such a shape as to be conveniently carried in one's coat pocket. Characteristics of a good storage cell forms the introduction and includes a fund of information. The application of chloride accumulators in railway power plants is next dealt with and includes illustrations of curves gained from actual practice. Chloride accumulators for all classes of work are thoroughly described, together with hints upon their proper location and care. The book concludes with a number of valuable tables covering a large range of subjects, all of which are vitally important to engineers. This booklet will be mailed to all engineers desiring a copy.

FRANK B. COOK, of Chicago, Ill., has recently had three decisions rendered in his favor by the United States Patent Office in interference case No. 23,636, Cook vs. Kaisling, relative to a self-soldering heat coil. July 25th, 1904, the department denied Kaisling's motion on leave to amend his preliminary statement. August 11th, 1904, the department denied Kaisling's motion for rehearing on leave to amend his preliminary statement. August 12th, 1904, decision was rendered denying Kaisling's motion to dissolve the interference on the ground that Cook had no right to make the claim, the examiner deciding that Cook alone was entitled to the claim in interference. Limit of appeal expired September 1st, and as no appeal was taken, the subject matter defined in the issue remains in Cook patent and must be erased from Kaisling's. Mr. Cook's success in patent suits seems phenomenal.

THE WILLIAMS TELEPHONE AND SUPPLY CO., of Cleveland, Ohio, has brought out a new style of switch hook which has genuine platinum contacts and is proof against grounding or short circuiting. This hook has four contacts and no pivot connections, four springs being used which are readily connnecting to the talking and ringing circuits. Neither the lifting spring hinged joint or the frame is used as a part of the electric circuit, thereby eliminating all possibility of loose contacts, which in that position would be difficult to locate. The platinum contacts furnish a positive electric contact in all climates and under all conditions of moisture and temperature. The springs are so adjusted that the hook is perfectly balanced. The hook is self-contained and can be taken out for any purpose without disturbing the other parts of the telephone. The lifting spring is of tempered steel, which is always uniform in its tension. The general design has been to supply the best possible hook and this the company believes has been done. A booklet has been prepared dealing with rural line construction and will be mailed upon request.

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED to correspond with investor for the advancement of Independent telephone interests in Eastern Iowa. Good territory; small capital. Address Box 250, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 250

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

AN energetic, qualified young man desires telephone position as assistant manager or contract agent west of Kansas City. Has had experience in Colorado. Address Box 252, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 252

WANTED—Position as manager or superintendent of telephone company; East preferred. Eight years' experience as superintendent of largest plants. Best of references. Address Box 248, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 248

WANTED—Bright young man of good appearance, who understands thoroughly technical telephony. One who has worked in the field preferred. Must be able to write descriptive booklets on telephone apparatus. Exceptional prospects for the right man. Address Box 242, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 242

POSITION WANTED—As manager or superintendent of telephone company; have had seven years' practical experience in all branches of the business. Address Box 247, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 247

WANTED.—At half value, fifty first-class second-hand compact series telephones (magneto) from some independent company that has changed to common battery. Must be from one of the best manufacturers. Address, Box 238, AMERICAN TELEPHONE JOURNAL, 116 Nassau Street, New York City. 238

WANTED to buy, parts of self-supporting guy. La Fayette Telephone Company, La Fayette, Ind. 254

WANTED, you to know that I can wind your coils. If you have any light machine work or models to make, write for particulars. Elmer Burlingame, 406 E. 3rd Street, Peru, Ind. 253

POSITION wanted as manager or assistant of exchange, 400 to 1,000 subscribers, within 150 miles of New York. Experience with Bell and Independent companies in all lines, construction, repair and maintenance, switchboard, lines and instruments. Address Box 249, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 249

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for six-inch thirties or seven-inch twenty-fives, we're the people you are looking for.

Of course we have all the other sizes, but we have a surplus of these two.

May we not hear from you?

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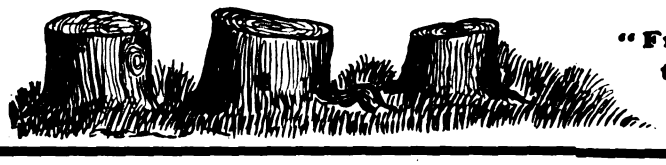
TIPPER & PATTON, Pittsburgh Agents, 512 Bessemer Building.

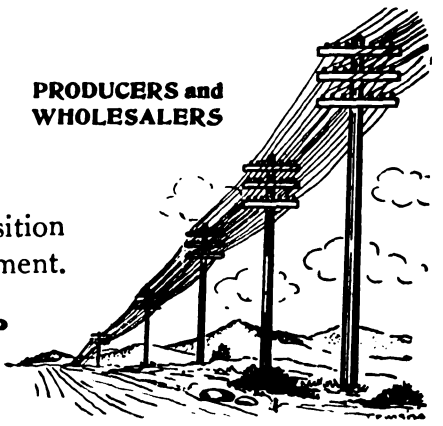
PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



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Any Length or Size,
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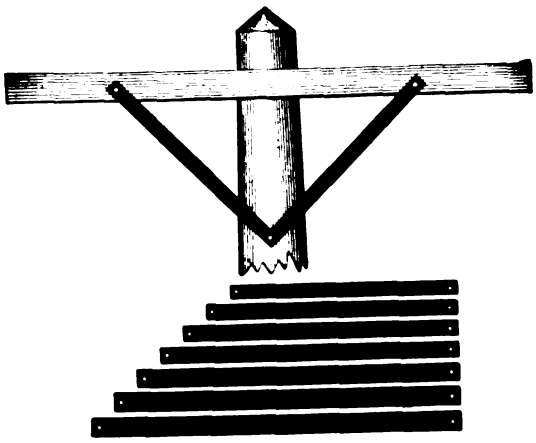

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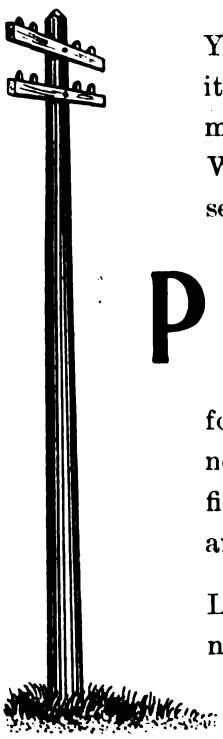

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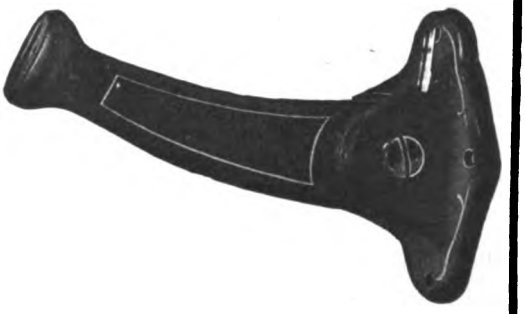

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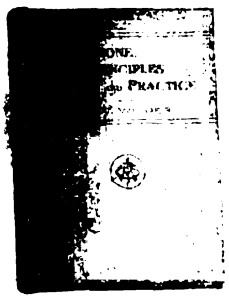

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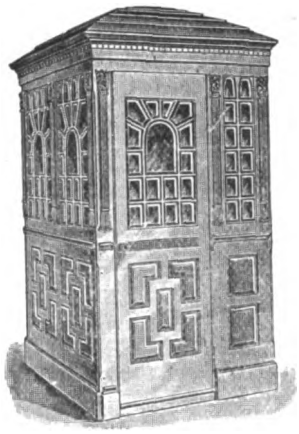

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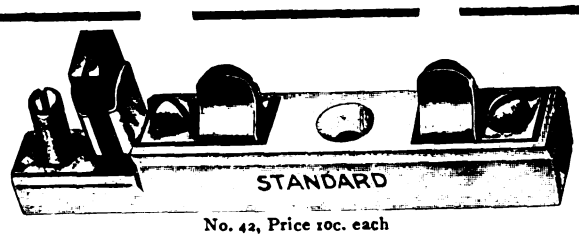

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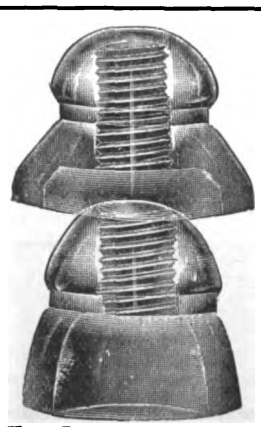

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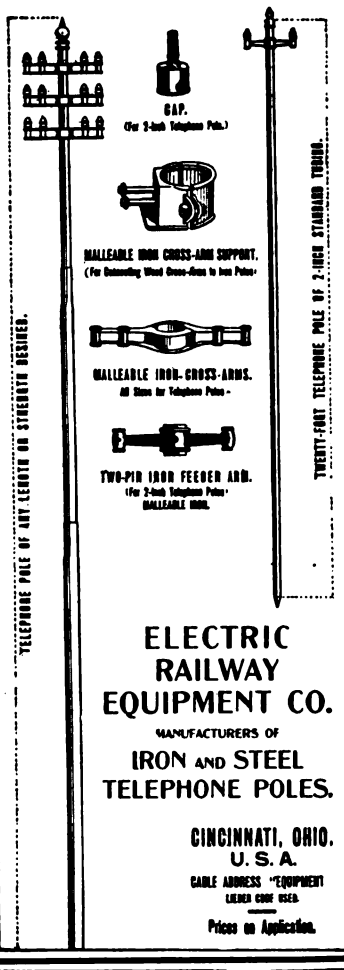

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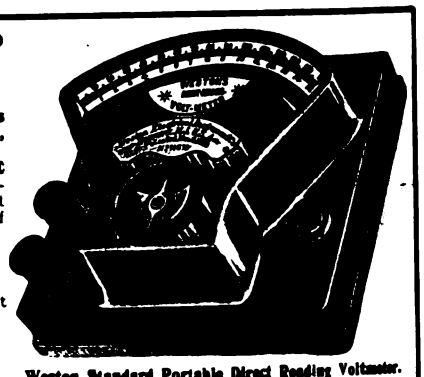

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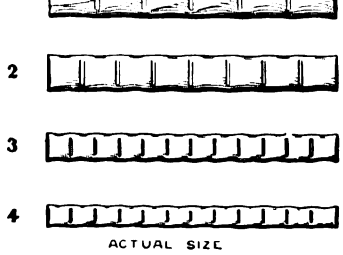

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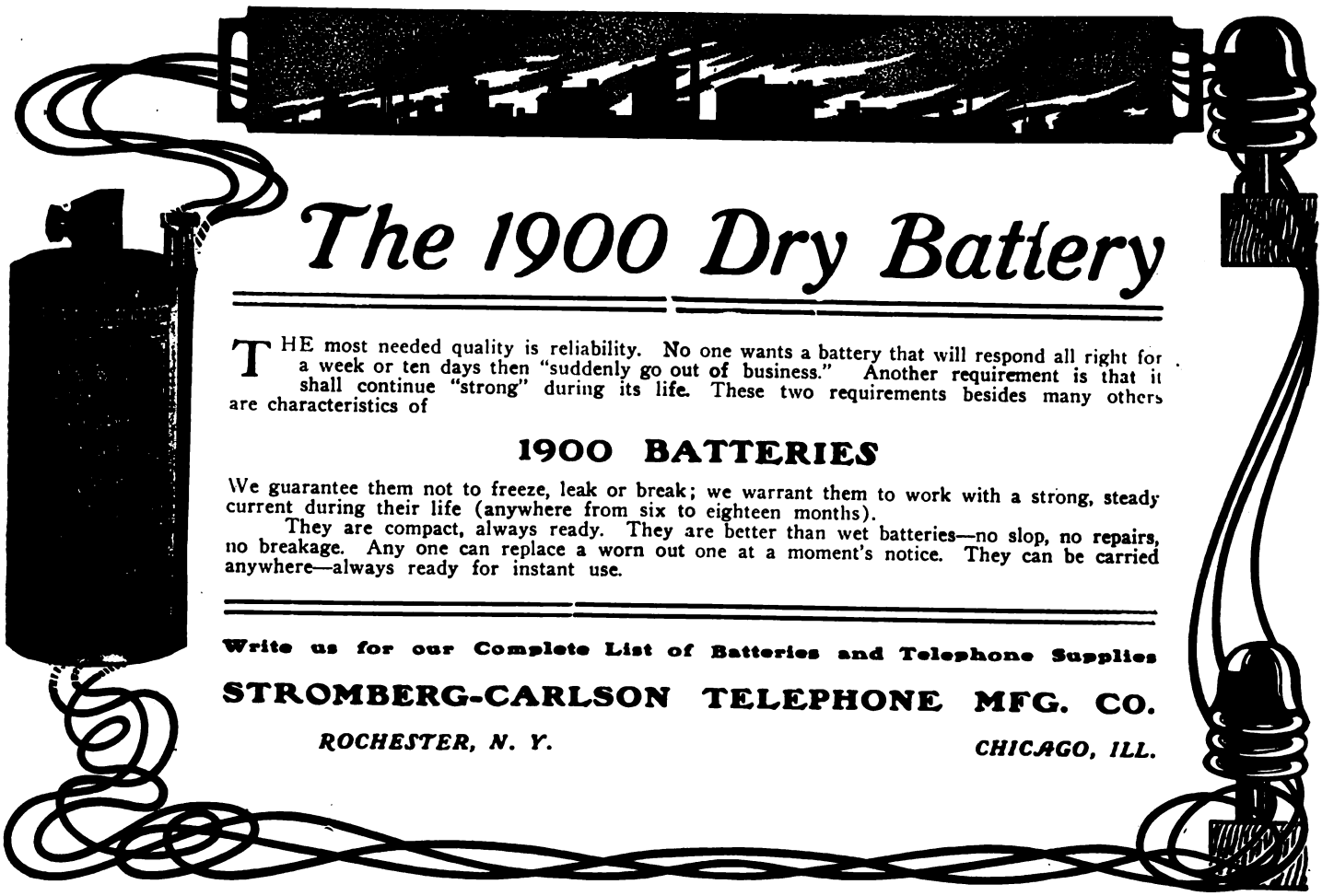

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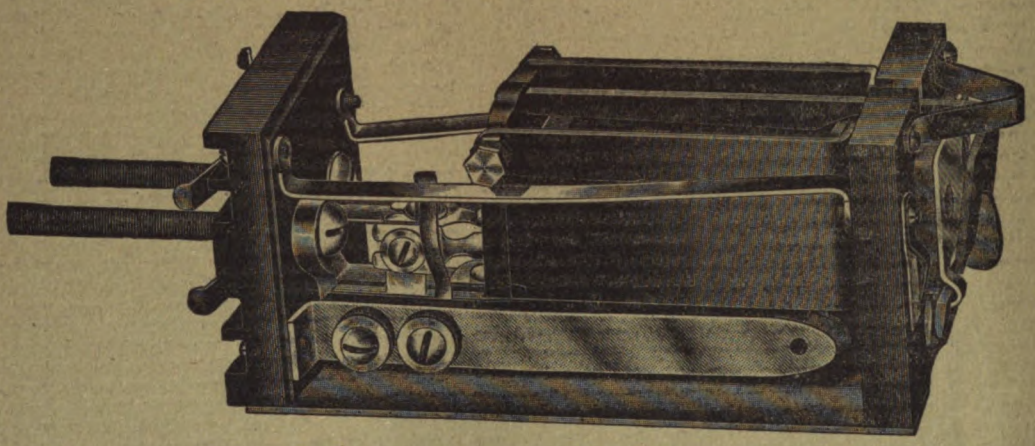

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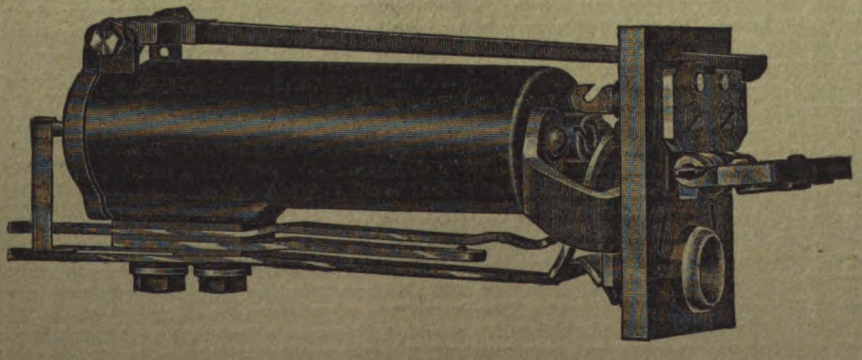

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Vol. 10 NEW YORK—OCTOBER 15, 1904—CHICAGO Number 16

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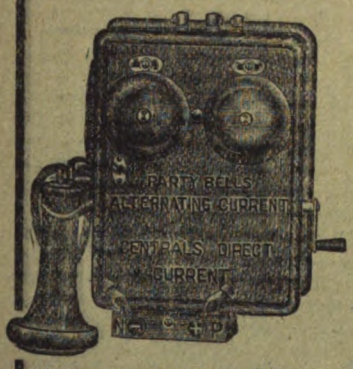

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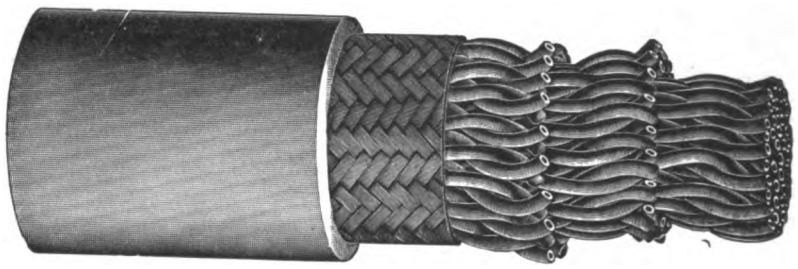

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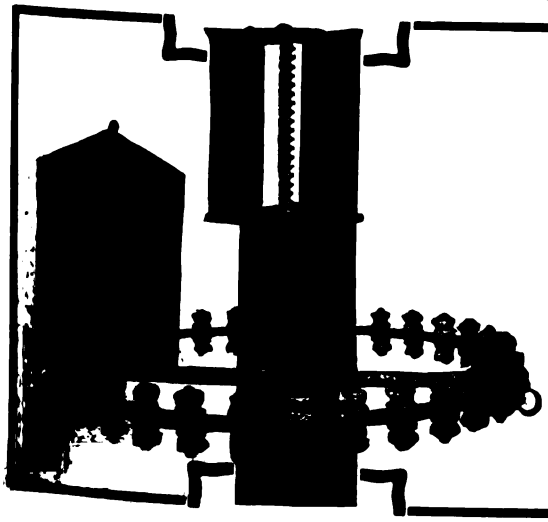

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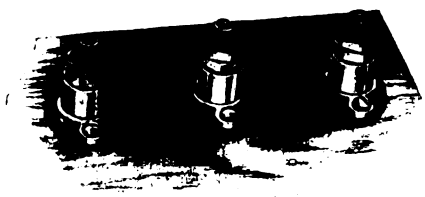

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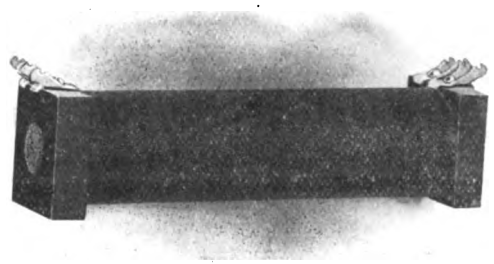

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This coil is used in all our Generator Call telephones. It is manufactured by automatic machinery, thus producing a coil that will give absolutely uniform results. The heads are made of seasoned maple, and are provided with convenient terminal clips. The windings consist of the best grade of copper wire silk insulated.

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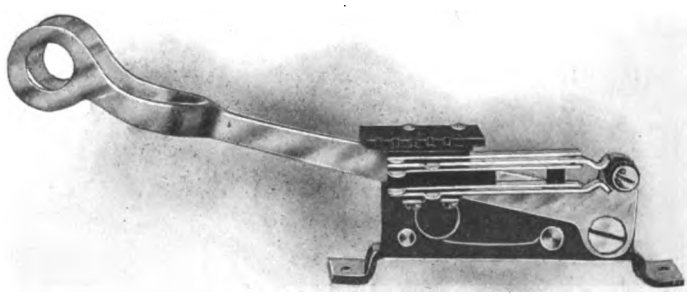

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No. 5 -- HOOKSWITCH

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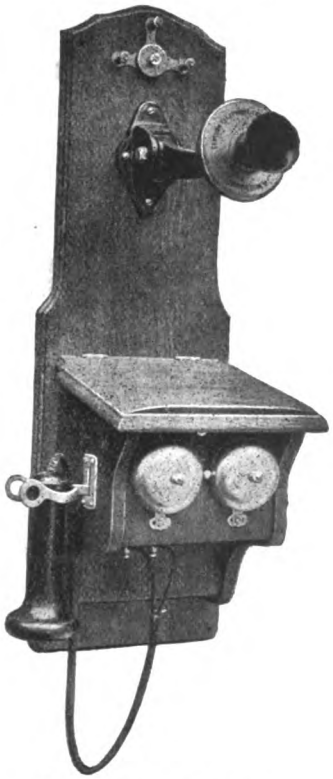

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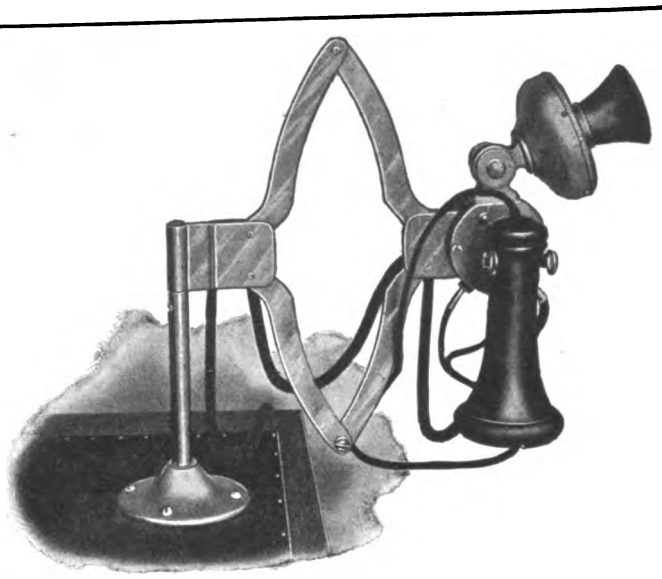

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Figure the difference between average cost of maintaining a wall and desk set, multiply by the number of desk telephones in use and see how much could be saved by replacing your old desk sets with Adjustaphones.

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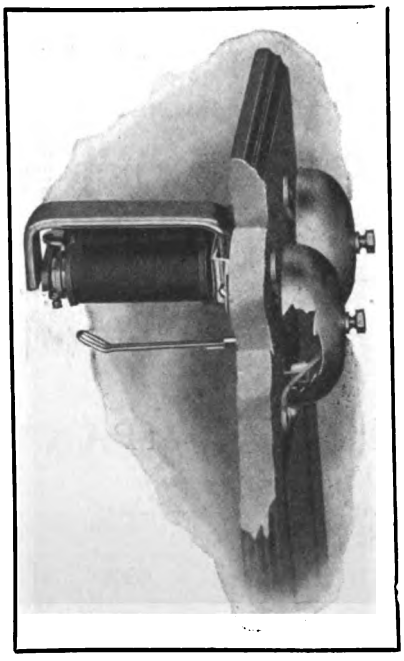

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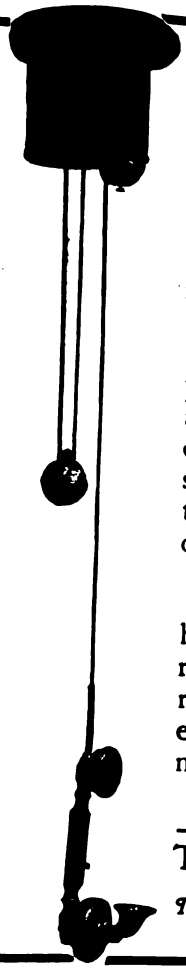

"A place for everything, and everything in its place"

A very good motto—as far as it goes.

In the very nature of things some places are inconvenient.

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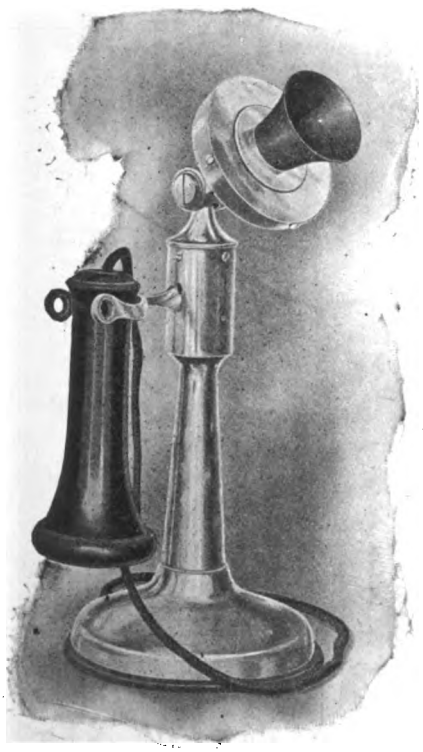

Judge Tourgee, describing a telephone conversation, said: "You step up to the instrument and say 'Hello' a few times, then you reverse it, and pretty soon you leave off the last syllable altogether."

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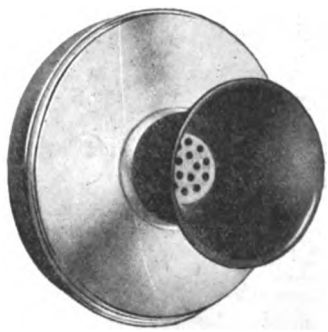

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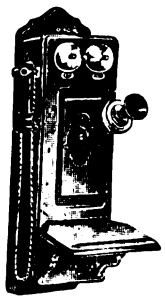

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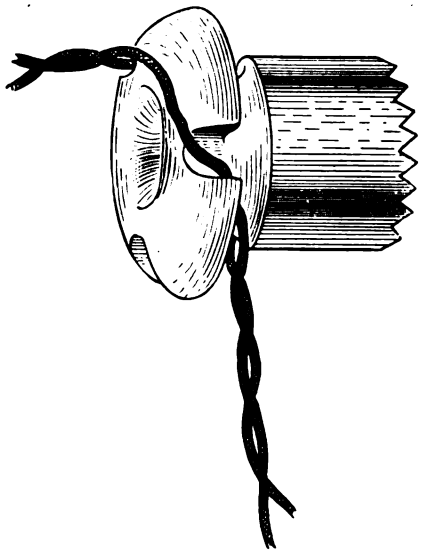

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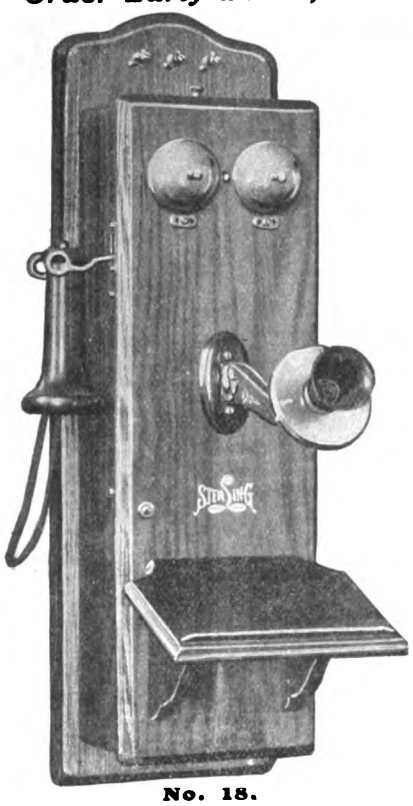

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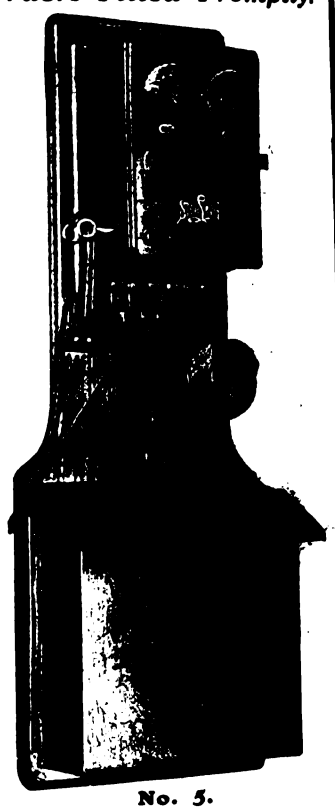

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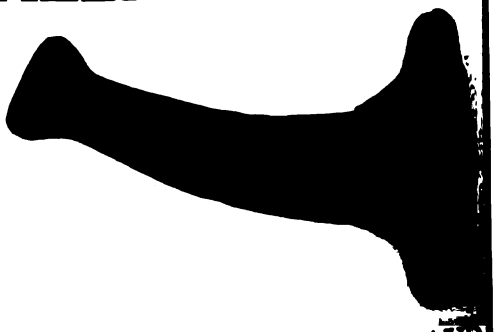

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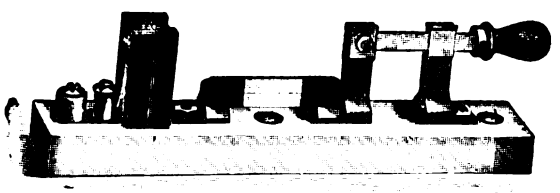

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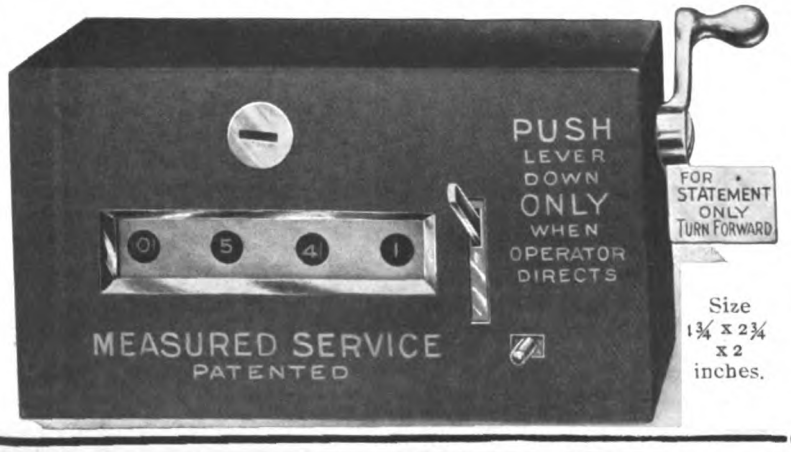

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VOLUME 10 SATURDAY, OCTOBER 15, 1904 NUMBER 16

TELEPHONE EXCHANGE ENGINEERING

ARTICLE XX.—CONDENSERS (CONTINUED).

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

THERE is no definite standard as to the shape, size and capacity of a telephone condenser, though now a two microfarad condenser, which will go into a space 9x5x¾ inches, is largely used. With the newer designs of telephone apparatus the condenser is constructed with a capacity to fit the electrical conditions of the circuit and of a size and shape to go into the space allotted. The result is higher efficiency circuits and more compact and neater apparatus.

Nearly all telephone condensers are now made of the rolled type, in which the two tinfoil plates and paper separators are continuous sheets. Enough condensers are easily constructed, and when made of adequate material and with proper care, will give practically no trouble.

Telephone Condenser Construction: The construction of a roll type, two microfarad condenser is as follows:

An iron plate, made as shown in Fig. 86, is used as a permanent core on which to wind the condenser material. The core is placed in a special winding machine so that it can be revolved about its long axis by a crank handle. A counter is arranged to keep record of the revolutions of the core and thereby give the operator the exact amount of material used. The winding machine contains four spools of rice paper 8.25 inches wide and 0.00125 of an inch thick, and two spools of condenser tinfoil 7.25 inches wide and 0.0005 of an inch thick. The material from each of these spools is fed through retarding devices, which always keep the paper and foil at an even tension, giving a smooth winding machine and from each other and are connected in series with a bell and battery, as shown in Fig. 87. Now, if the two tinfoil surfaces of the condenser roll become crossed, while winding, it will be immediately made apparent by the ringing of the bell.

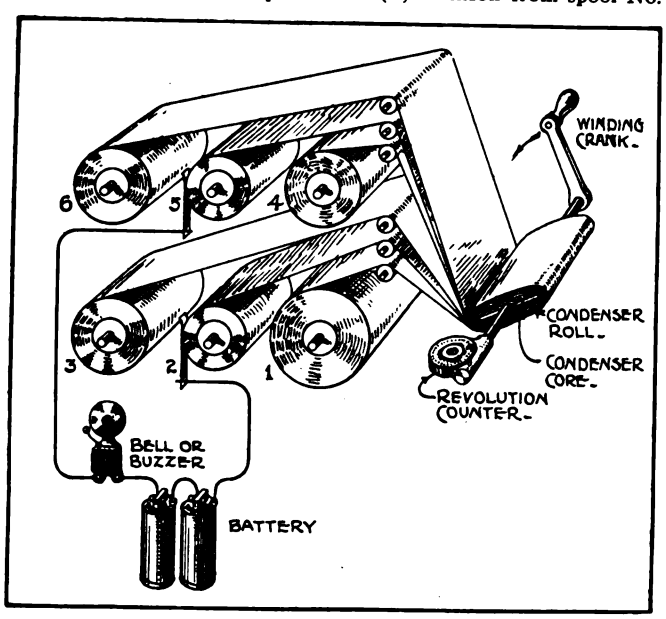

Fig. 87. Machine for Winding Roll Type Condensers. The Frame of the Machine is Omitted to Make the Drawing More Easily Understood.

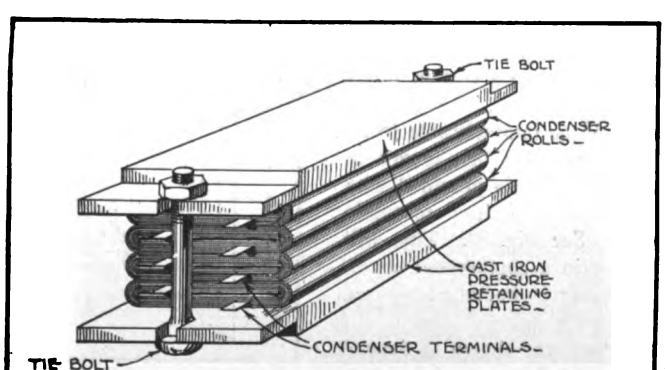

Fig. 88. Clamping Plates for Removing Roll Type Condensers from the Press while Under Pressure.

Winding: The operations of winding a condenser roll are as follows:

(a) Paper from spool No. 1 is started on the iron condenser core and the crank revolved four complete turns. This serves as an insulation from the metal.

(b) Tinfoil from spool No. 2 is started.

(c(Paper from spool No. 3 is also started, but is pulled out so as to overlap the foil No. 2 about one-half of an inch.

(d) The crank is revolved one-half turn so as to catch and hold No. 2 foil and No. 3 paper in the roll.

(e) Paper from spool No. 4 is started.

(f) Tinfoil from spool No. 5 is started, but is only pulled out to within one-half an inch of the length of the paper from spool No. 4.

(g) Paper from spool No. 6 is also started and pulled out to the same length as No. 4 paper.

(h) The elements *e*, *f* and *g* are now started into the roll and the crank revolved about sixteen and one-half complete turns, making twenty-one turns on the counter.

(i) A sheet brass terminal, Fig. 86, is inserted between paper No. 1 and foil No. 2, so that its small or connecting end projects at the top end of the condenser roll.

(j) The crank is revolved one-half turn so as to bring the other side of the condenser roll uppermost.

(k) A second sheet brass terminal, Fig. 86, is inserted between paper No. 4 and foil No. 5 in a similar manner to the first terminal. This brings the terminals on opposite sides of the iron core, the projecting ends being separated about two inches. Placing the terminals about half-way out on the winding gives a safer insulation after the rolls are compressed.

(l) The crank is now revolved twenty-four and one-half complete turns, making forty-one turns of foil or forty-five turns of the counter.

(m) Paper No. 4, foil No. 5 and paper No. 6 are now cut with

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a large pair of shears, about two inches from the winding roll.

(n) Foil No. 2 and paper No. 3 are also cut together, in the same manner, but about three inches from the winding roll.

(o) The crank is revolved five more complete turns, winding

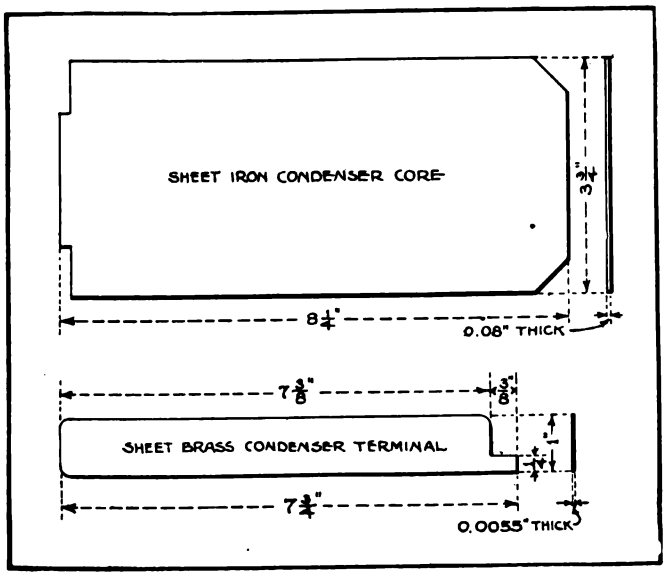

Fig. 86. Core for a Two Microfarad Roll Type Condenser, and one of the Two Terminals of a Two Microfarad Roll Type Condenser.

paper No. 1 over all, for an outside insulation. This makes a total of fifty turns of the counter.

(p) Paper No. 1 is now cut and its roll-end pasted down with Photo Library Paste (starch paste).

From this description of the winding of a condenser it will be seen that two sheets of paper separate one sheet of tinfoil from the other and for their entire length. This is done to give a higher insulation with a certain thickness of material and to prevent any conducting particle, which might lodge between the sheets, when winding the condenser, from easily puncturing the insulation and crossing the plates. Also any structural defect in one paper will be covered by the other paper.

In the construction under consideration the core constitutes a part of the finished condenser, but in the majority of makes, a temporary form is used to wind the condensers over, it being removed when the winding is taken from the machine.

Baking: The windings are now carefully baked for several hours in a special oven to drive out all of the moisture from the paper and from between the layers.

Boiling: Upon removing from the oven, the windings are placed in vats of boiling paraffine and allowed to remain until all of the air is driven out. Paraffine for condenser construction should have a high melting point and should be free from all acids or other impurities which would tend to lessen the insulation resistance.

Pressing: The windings are taken from the paraffine vats, placed between hot metal plates and squeezed to a certain thickness, in which position they are allowed to cool. As it takes several hours to do this cooling—it would be impracticable to allow the condensers to remain in the press for this length of time. So the hot plates, previously mentioned, are provided with slots for end bolts, which can be screwed in position to retain the pressure given by the large press. See Fig. 88. This will allow the condenser rolls to be removed in a compressed condition and set away to cool while the press is immediately used for more condensers.

The electrostatic capacity of a condenser was shown to depend on the thickness of the dielectric material between the plates, provided the plates were in contact with this material. It is for this reason that the paraffined condenser roll is compressed. The previously described condenser winding is designed to give a capacity of two microfarads when given the proper pressure. If it is given less pressure, the condenser will have a greater thickness of dielectric material and the capacity will be correspondingly less. With a greater pressure, the dielectric material is made thinner and this condenser roll can be made to give a capacity of over ten microfarads. In this connection, the question often presents itself: Why not use less material in the roll and use greater pressure to give the proper capacity? The reason is obvious, for when the thickness of the insulating medium is decreased the condenser is not only subject to greater leakage, but is more liable to break down under the electrical pressure to which it might be subjected to in practice. For some circuits, however, when the condenser is protected by a permanent shunt of low resistance, or when there is only a small electrical pressure at the condenser terminals at all times, it is permissible to use a condenser with its capacity obtained by greater pressure. This of course gives a much smaller roll and the finished condenser can be put in a much smaller space. For example, a one-half microfarad condenser can be made to occupy a space $2\frac{5}{16} \times 1\frac{3}{16} \times \frac{3}{4}$ inches. A condenser of this size will easily go into the base of a desk stand.

When the condenser rolls are compressed, several are placed between one set of hot metal plates, as shown in Fig. 88, so as to be squeezed together. The press forces these plates together until they meet a separation gauge; the length of which is equivalent to the desired capacity of the condenser. In the case of the two microfarad condenser under consideration, the thickness of one compressed condenser is about 0.49 of an inch.

In pressing the condensers the hot retaining plates keep the paraffine from hardening until the proper pressure is obtained. After the condensers are thoroughly cool the tie bolts can be loosened and the rolls removed without fear of relaxing their permanent set.

At this stage of construction, some manufacturers give the condensers a preliminary test for capacity so as to reject all rolls not coming up to standard, before doing more work on them.

Casing: Unprotected condenser rolls can be used commercially, but are liable to injury, especially when kept in stock and subjected to handling. A metal covering, in the form of a sealed tin box with projecting terminals, gives proper protection and facilitates mounting in telephone equipment.

The two-piece condenser case, shown in Fig. 89, is of the

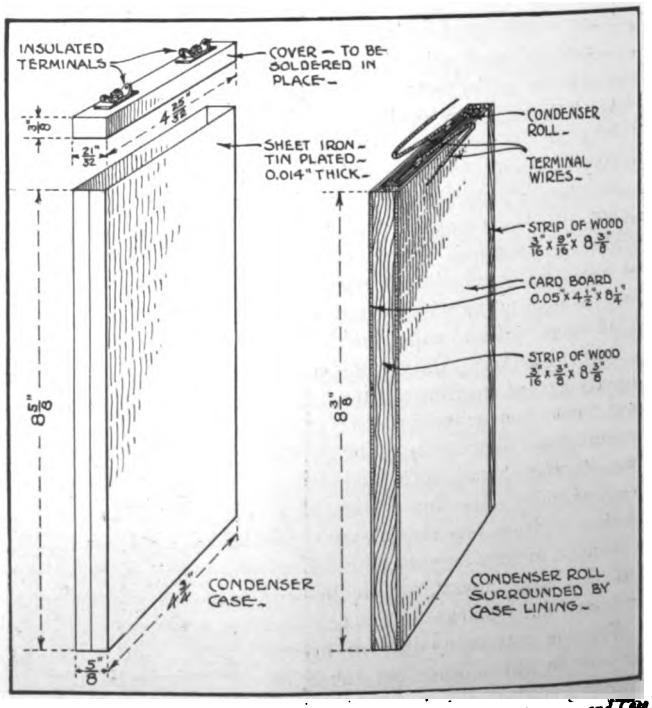

Fig. 89. Metal Case Used as a Housing for Roll Type Condensers, and Case Lining Surrounding Condenser Roll.

proper dimensions to hold the previously described two microfarads capacity roll. Fig. 89 also shows the lining materials of this case placed about the condenser roll in their assembled positions.

Any tendency of the metal cases to bulge at the sides is pre-

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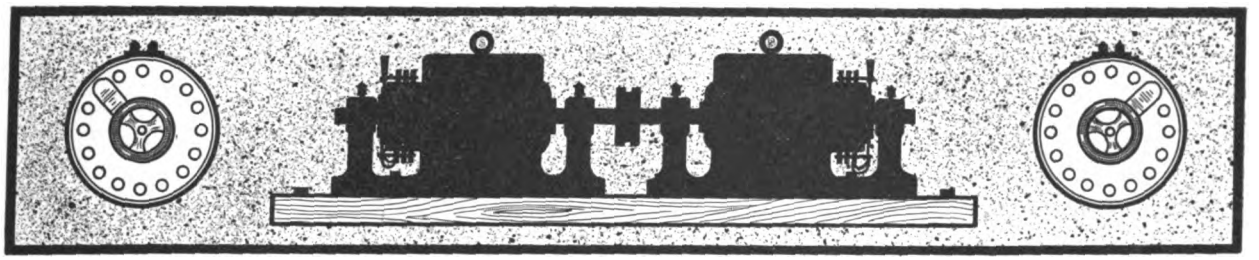
vented by placing the condensers in a press, a quantity at a time, and while squeezed to their normal dimensions, the remaining air spaces in each are filled with melted paraffine. It is obvious that this paraffine could not be poured very hot and in large quantities without loosening up the rolls and damaging the capacities of the condensers, so it is taken just above the melting point. The terminals of the condenser rolls are now connected to the insulated case terminals by short pieces of covered wire, after which the case covers are soldered in place. The condenser is now complete, excepting a finish of japan or enamel, which is applied to the surface of the case by dipping or otherwise.



ECONOMIC FEATURES IN MODERN TELEPHONE ENGINEERING

By Le Roy W. Stanton.

THE past quarter of a century has seen a most marvelous development in every phase of industry, and this is specially true in the art of telephony. The present unparalleled demand for telephone service indicates that the next ten years will see improvements in design of equipment and methods of construction that will eclipse the past decade. The unprecedented telephone development of the past few years has taxed the ingenuity of telephone engineers. While they have met the problems with remarkable success, there is room for even as great an improvement in the future. This is especially true in equipping city exchanges where there are a large number of subscribers. So two distinct methods of supplying service in large cities have developed. One uses a large individual office, while the other provides a number of multiple or branch offices interconnected by trunks. The single office possesses many advantages in small and medium sized cities, while in our largest cities it becomes impractical at the present state of the art to supply telephone service from one central office, and as a result, branch offices are a necessity.

In cities which develop a telephone population of 20,000 to 25,000, within a radius of four or five miles, from the telephone center an individual office, built after the most modern ideas, possesses many advantages over multiple or branch exchanges, such as more prompt and accurate service and by effecting a decided economy in operating.

Each subscriber's call, when there is only one office, is handled directly by one operator instead of being passed through two, over trunks connecting branch exchanges, thus saving time and expense and reducing the liability of error. There is also economy in other items, such as rent, taxes, light, heat and other office expense. The supervision in a single office is better, because it is under one management, instead of being scattered in a number of small exchanges. But in a single central office there is a larger investment in the wire plant, on which there is an annual fixed charge for interest and depreciation.

With the correct number of branch offices properly located, the average wire mileage per subscriber is reduced, because each office is nearer to the group of subscribers that it serves. The trunks connecting the branch offices add somewhat to the total wire mileage, but in a well designed multiple office plant, the trunk wire mileage plus the line mileage is considerably below that of the line mileage required to connect the same subscribers to one central office. However, if there are too many branch offices the total wire mileage exceeds that of the individual office, owing to the fact that the number of trunks joining the various offices increases in arithmetical progression, while the number of offices increases in direct ratio. This is clearly illustrated if we consider each subscriber's station as a branch office and join each subscriber to every other subscriber with a pair of wires, which we will consider as a trunk.

To connect four subscribers it would require six pairs of wires, to connect eight subscribers would require twenty-eight pairs, to connect sixteen would require 120, and so on. From this it will be seen that there is a limit to the number of branch offices for a city of a given size, and if this number of offices is exceeded, we not only increase the total wire mileage, but also the operating expenses and complications in trunking and decrease the efficiency of the service. In addition to the extra expense for trunks joining the various offices there is the additional expense of the trunking apparatus. This also increases as the number of exchanges increases, but the expense is offset more or less owing to the decrease in the cost of the subscriber's multiple.

The number of branch offices that was the most economical to serve a given number of subscribers a few years ago is far from the most economical number of offices for serving the same number of subscribers under modern conditions. Recent improvements in the manufacture of lead covered cables and improved methods in outside construction have very materially reduced the cost of the wire plant. This together with the most advanced ideas in central office equipment has greatly increased the capacity and reduced the first cost of large individual exchanges.

Owing to improvements in switchboard construction there is, at present, no difficulty in securing a central office equipment for handling at least 12,000 lines. In some cases switch boards having a capacity of 18,000 to 20,000 lines have been installed, but such large boards are not advisable owing to the fact that the jacks have to be made too small and the plugs having very little strength, are easily broken, there are also traffic disadvantages which prevent rapid and accurate work on the part of the operator.

Operators in making connection in the multiple develop what would be known in psychology as the sense of muscular touch, which allows the operator to make connection almost without looking. Where small jacks are used, this to a degree is lost, operators must further become familiar with the location of 20,000 jacks which is beyond their capacity. Four division boards have also been resorted to, but the inevitable complications make them impractical. A modern exchange having 12,000 answering jacks and equipped to furnish four party line service can handle 20,000 or 25,000 telephones and gives a far superior service to that

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furnished a few years ago over multiple boards of 5,000 to 6,000 lines in a city. Formerly the difficulty of building large multiple boards offered a very formidable barrier to large individual exchanges; because the size of the jack prevented more than 5,000 to 6,000 from being placed in reach of one operator. Recent improvements have eliminated the third conductor and reduced the jack to two springs. This exchange, together with the improvements in mechanical design, and better workmanship has made it possible to place 12.000 lines within reach of an operator. A further result of the above improvements has been reduction in price of multiple jacks of at least two-thirds below that of the much inferior product of a few years ago.

While there have been remarkable improvements in the central office equipment, there have been also rapid strides made in bettering distribution to subscribers. Improved methods in the manufacture of telephone cable have increased their efficiency and very materially reduced their cost, so that to-day cables can be installed in underground conduits at a cost per pair of wires far below that of a few years ago and have increased in like proportion the territory served by one exchange. Four hundred pair cables are not uncommon today and in some cases six hundred pair cables have been used. A four hundred pair cable carried near the outer boundaries of a territory to be supplied by an exchange and distributed from this point according to the most advanced practice in multiple, cable distribution, serves the territory in the most economical way, and where a portion of the lines are party lines, the capacity of the cable is from 800 to 1,000 substations.

These figures are based on the average number of telephones per circuit found in a number of our leading cities.

It is noteworthy that the outlying districts are larger users of party lines than the central portion of a city, so groups of subscribers within a radius of four or five miles from the central office can be served much more economically, the expense of operation being lower than of a branch exchange, and the first cost little, if any, greater, if we assume that real estate be purchased, a first class building erected, modern central office equipment installed, and both offices connected by trunks through cable in underground conduit. The underground conduit remains practically the same whether the district five miles from the central office be supplied by the cable direct from the main office, or whether it is served by a branch office with connecting trunks. The additional cost of a four hundred pair cable over the cost of the trunking cable to connect the branch offices, will be considerably less than the cost of real estate, building and branch office equipment. On the other hand, the expense of the extra multiple for the four hundred additional lines entering the central office will be greater, but the extra trunking equipment and multiple, which will be eliminated when branch offices are not used, will, more or less, balance the cost of the main office multiple.

In summing up the advantages and disadvantages of individual and multiple exchanges, we find that large individual offices possess advantages of being cheaper to operate and afford a more prompt and accurate service and are cheaper in first cost.

With multiple exchanges, we find that they are necessary in the largest cities because satisfactory equipment cannot be secured for serving a sufficient number of subscribers. Another strong point in favor of the multiple office is that in case of fire, the service of the entire system is not crippled.

While these systems are handling the telephone traffic of our cities in a fairly satisfactory manner, the day is probably not far distant when they will be superseded by a combination of both, together with the aid of automatic trunking, which will materially reduce the first cost of the telephone system, and also that of operation. The writer has given some thought to a system which, broadly speaking, would be one central exchange from which trunks would radiate to all parts of the city, and terminate in small automatic branch exchanges to which the present form of common battery substation equipment would be connected.

A subscriber upon lifting the receiver would operate in the branch office a line relay, which, instead of lighting a lamp, would energize a simple selector switch that would select a trunk line to the main office which was not busy. The trunk on being connected would operate a line relay at the central office, which would actuate a single selector, and connect an operator that was not busy and in turn select the connecting cord that was not busy, and light the lamp associated therewith, placing the operator in talking connection with the subscriber. Upon receiving the number of the party wanted, which we will say is "Century No. 78," the operaor would insert the plug of the connecting cord in the jack of the outgoing trunk to the Century branch. In operating an ingeniously designed selective key, she automatically and almost instantaneously selects the station called for and starts automatic ringing, which continues until the subscriber answers. Upon inserting the plug in the trunk jack, she extinguishes the lamp lighted by the party calling, and automatically disconnects her listening set from the subscriber's line, leaving the conversation of the two subscribers absolutely private and at the same time leaving her position open for another call. The subscribers upon completing their conversation and restoring the receivers are automatically disconnected owing to the opening of the circuit of the subscribers' line relay, which releases the automatic selector, thus leaving the trunk free for other calls and giving the subscribers an opportunity to immediately call again. It is true there is a plug left in the outgoing trunk, but upon the automatic disconnecting of the two subscribers this cord and plug are cut dead, the busy test taken off of the trunk jacks and a disconnect lamp signal lighted, which notifies the operator to take down the cord, the removal of which leaves the cord so it will not test busy to incoming calls.

With the system as outlined it would not be a difficult problem to handle the extreme development of our largest cities from one central office. With a development of 100,000 telephones which some of our cities have at the present time it would be unnecessary to place in front of an operator more than a few hundred trunk jacks. These being common to this position only, there would be only a few trunk jacks for each branch office for each operator's position. The operator in plugging into one of these jacks would operate a selector which would automatically select a non-busy trunk to the branch exchange; over this trunk the impulses travel from the operator's selective key, which select the subscribers in the branch exchange. This method saves the operator the time and trouble in testing for non-busy trunks and eliminates a great number of trunk jacks which would otherwise be multipled in front of all the other operators.

In medium-sized cities, all outgoing trunks could be multipled in front of each operator. This would eliminate the outgoing trunk selector and the operator would test as usual for non-busy trunks. For incoming calls there would be no equipment placed in an operator's position except a few connecting cords with their indicating lamps. Incoming calls come in over trunks which terminate in a distributing room and from there are automatically distributed to the operator's positions. In large offices, it would be necessary for the incoming trunks to be divided into sections so that the selector would not have to be built so as to distribute to too many operators' positions. Different classes of service, such as measured service, flat rate service, etc., would come in over separate sets of trunks which distribute to sections in which there are operators who handle these only.

The first cost of the wire plant in this system will be very materially reduced owing to the grouping of subscribers in small groups and automatically trunking the same direct to the main office.

It has been found from data compiled from a number of operating exchanges, that one trunk will, on the average, where the exchange is of sufficient size, carry the traffic of 12 to 15 subscribers' telephones, and in this way we gain the advantages of party lines without their attendant evils.

This principle has been taken advantage of to some extent in multiple exchanges, but the full benefits cannot be derived owing to the rapid increase of the number of the trunks with the increase in number of the branch offices.

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When branch offices are used and connected as just described, 100 branch offices would require 4,950 separate sets of trunks, while with the direct trunking to one central exchange there will be only 100 sets of trunks required or the same number of sets of trunks as there are offices. Therefore, in direct trunking, we would use one set of trunks composed of a large number of circuits instead of 100 sets of trunks with few circuits in each set of trunks.

It has been observed in practice that in offices which have only a few trunk circuits joining another office, the average maximum number of messages per trunk circuit per day does not exceed 70 to 80, while in large offices requiring a great number of trunk circuits, each circuit often averages 157 messages per day. From the data given that trunks from a large office carry more than twice as much business per circuit per day as do trunks from small ones. This is due to the greater fluctuation in traffic in small offices. We thus see that there is a decided saving where the business demands a large number of trunk circuits and in direct trunking where a large number of trunk circuits are used. There is also a saving in the time of connecting and disconnecting due to automatic trunking and in the elimination of order wires, etc.

From this we see there is a decided saving in the trunk circuits where direct trunking is employed. There is also a saving in the time of connecting and disconnecting and in the elimination of order wires. On the other hand, all calls have to be trunked, but in small offices the number of calls trunked sometimes reaches 95 per cent. of the total calls, so the extra trunking is not of great consequence.

This system allows the use of the present common battery telephone set which is simplicity itself and adds no complications to the substations which are scattered over miles of area, all equipment which is liable to derangement being located in the central or branch offices. The branch offices would not require installation of expensive power equipment, for all power required for operating the branch exchanges could be supplied from the central office. Current for talking would be fed from the cord circuits in the central office, where 40 or 50 volts would be used, which would prevent an excessive drop on the long line. This, in connection with the latest transmitters, which are especially designed to work on lines of high resistance, solves the problem of supplying the subscribers who are remote from the exchanges.

In case the branch exchanges are at too great a distance from the central office, the subscribers' loops can be supplied with battery for operating their transmitters from the branch exchanges, only a slight modification in the equipment being necessary. There would be no ringing current required at the branch office and the current for operating the line relays and selector switches would be small and could be supplied by local storage batteries charged from a 110-volt circuit over trunk wires from the central office or from the local lighting circuit. This plan was devised by the writer a few years ago for supplying the private branch exchanges for the Cuyahoga Telephone Co., of Cleveland, O. This company is now operating nearly one hundred private branch lamp signal boards from storage batteries charged over trunks as described. The results are proving satisfactory and economical. In charging the batteries sufficient resistance is inserted in the feed wires so that the batteries receive the proper amount of current to maintain them at full charge.

Every two weeks an inspector tests the specific gravity of each cell, takes a voltage reading and examines the private branch board. The cost of maintenance is in this way reduced to a minimum.

The space required for locating these branch exchanges would be small. An inexpensive room in one of the large office buildings would answer very well for supplying such buildings in the business districts. In the outlying districts suitable quarters could be secured at a much lower cost than where expensive equipment has to be housed and operators' quarters provided. The greater the number of branch exchanges, the less the wire mileage for each subscriber. One main underground cable could be tributary to a number of small branch exchanges. The system, besides being more economical in first cost, admits of a decided saving in operating expenses. The number of operators are materially reduced. The trunking or B operators are eliminated entirely and quite a number of the regular A operators, because each operator would be working at her highest efficiency at all hours of the day. She would be constantly busy; the service prompt and uniform; she would never be overloaded, for she can only receive one call at a time, as the automatic distribution sends calls to the non-busy operators. The subscriber in lifting the telephone is immediately put in talking connection with the operator and gives the number desired without the request for "number." The operator repeats the same and glances at the keyboard, seeing a lighted lamp, which indicates the cord to be used. Whereupon she plugs into the outgoing trunk jack, presses the selector key which picks out the line desired. Owing to the few number of movements required and because the operator is constantly kept busy, she will probably answer two to three times the number of calls usually handled in the same length of time. Night service, Sunday service and such portions of the day when the load is light, a number of the operators could be dispensed with owing to the fact that the first operator's positions receive all the calls and the last positions are called into service only during the rush hours of the morning. The system as outlined reduces the first cost of the wire plant, eliminates all the multiple answering jacks and line lamps, and reduces the operating expenses and uses equipment composed of parts of the manual and the simpler parts of the automatic and posseses the advantage of unit, multiple and automatic exchanges.*

*Paper read before the International Electrical Congress at St. Louis.

THE TELEPHONE.

Here's to you!
Cheers to you!
Telephone!
Rancor
And spite
And a mighty
Sight
Of
Tender sighs
And
Business lies
Have come
And gone
Along your
Copper highway.
It's nobody's
Biz,
But
Gee Whiz! Think
Of the
Kisses of
1000's of
Misses
You've had.
Execrable
Taste to
Waste
A kiss on
You —thing of
Rubber and
Steel
And
Revolving
Wheel and
Diaphragm.
You're only a
Sham.
You haven't a
Tongue
Or a
Lung,
And yet you
SPEAK!
You haven't
An ear, and
Yet you
HEAR!
Some day you
May
Get
Gay,
And say,
What you'll
Tell will—
Well—
Raise
HELL—O
Central,
Ring Off!

—*Life.*

INDEPENDENTS WIN IN SUPERIOR, WIS.

THE People's Telephone company of Superior, Wis., has won out over the Bell people as far as the fight before the council committee here is concerned. The result is that for the present there will be no further effort on the part of the Bell people to get their telephones used free of charge to the city hall and other city buildings.

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TELEPHONY IN CENTRAL TEXAS

By R. M. Jones.

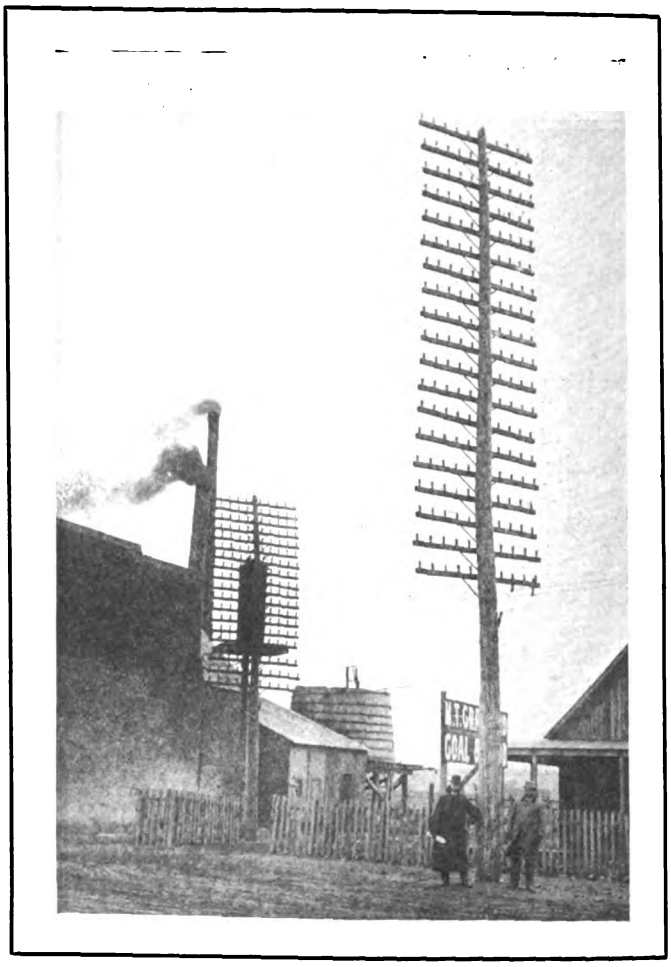
R. M. Webb, General Manager.

THE development of telephones in the Southwestern States has necessarily been slow. The reason for this is the sparsely settled condition of the country, and also to the fact that the Bell had never till quite recently made any efforts to establish systems unless there was a practical guarantee that the returns should be as high in proportion as those secured in thickly populated districts. The advent of competition in the shape of Independent systems changed this state of affairs and now throughout the country districts Independent systems are almost exclusively found and in many parts they have supplanted the Bell.

Texas is truly a State of magnificent distances. The largest in the Union in size, it is also one of the most progressive. From the standpoint of population, however, it is far surpassed by many of the smaller States, but even this condition is rapidly changing, owing to the increased facilities in the way of communication and travel, and through the great opportunities it offers to the man with a progressive spirit.

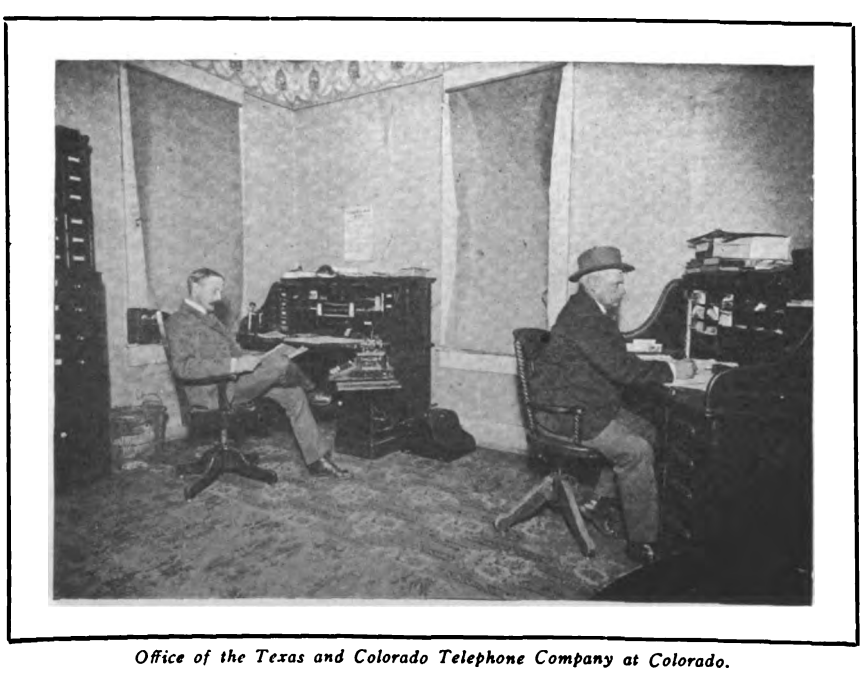
Dating from the commencement of Independent telephony a new condition has arisen which bids fair to outrival all competitors as a commercial agent. Formerly the prime factor in the success of a town was its conveniences for travel. If they were ample then growth was only a matter of a very short time, but now the question that often arises is what are the means for communication? How are the postal facilities? Is there sufficient telegraphic service, and most important of all, is there a telephone system? The telephone is a necessity, and is of more value even in smaller communities than larger ones. That this is true is evident from the enormous number of country lines which have sprung up within the past few years, and which to-day are being constructed in every part of the country.

An illustration of this class of telephone service is well given in a description of the system of the Texas and Pacific Telephone company, which operates in the counties of Mitchell, Nolan,



Termination of Pole Line at Colorado.

Scurry and Taylor, with head office at Colorado in Mitchell county, and branch exchanges at Roscoe, Markel, Snyder, Light and Sweetwater.



Office of the Texas and Colorado Telephone Company at Colorado.

About six years ago a small Independent exchange was opened in Colorado, but owing to adverse conditions little progress was made for the first three years. In 1901 the plant, which then consisted of 85 telephones and one toll line about 28 miles long, was bought out by and reorganized under the name of the Texas and Pacific Telephone Company. At once the business commenced to expand and shortly afterwards several other exchanges were secured, and a system of toll lines constructed. To-day there are 600 miles of toll lines and upwards of 800 subscribers. In the city of Colorado alone there are 280 in a population of 2,000.

This progressive company at present has a capitalization of $40,000, and is on a first class paying basis. The demand for telephone service is so great that a large number of applicants are always on the waiting list. The present officers of the company are J. N. Weakley, president; B. S. Van Luyl, vice-president; R. M. Webb, general manager, and E. Keathly, auditor. Many of the lines run for

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miles to give service to ranches, and in consequence a number are party lines, although in no instance are the lines overloaded. The largest number placed on one line is six, although a large number are two, three and four party.

The rates charged are $2.50 for business houses per month, and $1.50 for residences. All the instruments are of the bridging type, manufactured by the Sumter Telephone Manufacturing Company of Sumter, S. C. This firm has also supplied the switchboards which are magneto of 100 line capacity. Warner pole changers are used for ringing.

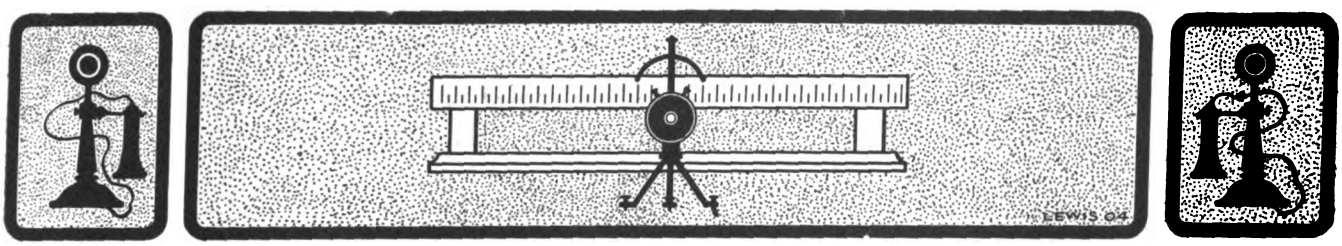
The line construction is first class, poles being used exclusively, although in this part of the country numbers of lines are constructed on wire fences. The circuits are mostly grounded, except the toll lines, but as there are no trolley roads in the vicinity there is very little trouble from noisy lines.

Since there is no competition, development has been very fast, considering the nature of the territory covered. The people are entirely satisfied with the service and consider it as much of a necessity as the mail or railroad.

In closing, a few words about the opportunities that constantly arise in the telephone field will not be out of place, since this article offers a very good illustration.

The general manager of the company, Mr. R. M. Webb, was formerly engaged in business in New York City. On account of failure in health he was compelled to move to some drier climate and chose Texas. After two years spent on a ranch to recuperate, he entered the telephone field, and was instrumental in organizing this company. The results of his management are self-evident. What is true of this case is also true of hundreds of others.

Business ability combined with a progressive spirit make success in every enterprise, and in no other are there better opportunities than in the Independent telephone field. Notwithstanding the great development of telephony in the past few years, it is yet in its infancy. North, South, East and West there are large areas of country where a telephone system would be a boon to the community. The Southwest is one which offers particular inducements in the matter of climate and people.



AUDITING FOR TELEPHONE COMPANIES

By I. D. Gindhart, Jr.

The Auditing Department of a telephone company is gradually becoming a very important one, and as business expands and the control of vested capital finds itself in hands more or less scrupulous and skilful a closer, more vigilant watchfulness upon the income and disbursements of corporations is required. This is the need of the day and has been met throughout the country by the formation of audit companies and auditors in charge of their departments.

"*Auditing is a necessity.* How much so depends on the management and size of the company. Railroads have long ago conceded that auditing and accounting went hand in hand with the operating departments and their auditors and statisticians to-day held enviable positions, consulted by the presidents, general manager and board of directors.

"The opinion is sometimes expressed that the cost of placing statistical information in the hands of the parties to whom such information is of value, is greater than is warranted by any benefit accruing. But the fact still remains that all large companies to-day find it profitable to send thousands of dollars annually in the preparation of reports to show all details of the business and to place before the executive heads the cost of each department, that all leaks may be stopped.

"Auditors agree that auditing is an art; that is, auditing in its broader sense, which includes all branches of accounting. Bevee tells us, the art of a thing is first its aim, and next its manner of accomplishment. The aim of the audiitng department is primarily a careful record of all income (crediting the respective sources) and all disbursements are charged in such a manner that the expense of the business may be easily determined.

"Comparative records will often cause the dismissal of a careless and expensive district manager and prove that the industrious, conscientious manager is making things pay. A cost book showing itemized cost of construction will oftentimes show an unnecessary increase of cost of one line over another. A cost book is easily kept by having a cost number for each new undertaking and posting all material labor and proportion to general expense to the cost and closing the account when work is completed.

A daily report of stock receipts and disbursements is an excellent check upon storekeepers, and it is well that semi-annual inventories be made to adjust stock ledgers.

"Comparative reports of earnings per trunk line show when a line has exceeded the estimated carrying capacity or indicated if it is operating at a loss.

Taking care of toll business was the bugaboo for a time and many were the methods of the settlements, but now it is an easy matter, as it is shifted upon the traffic association.

Every telephone corporation has its own method of auditing. These different methods are extremely annoying to the purchaser of bonds or stocks and oftentimes tends to confuse one's ideas of actual value of the properties.

We must look forward to the day when consolidation will take place and companies will be grouped together and *standardization* will be the keynote.

To this end I suggest a telephone auditors' association for the purpose of standardizing the accounts, using a system elastic in its principles applying to the small as well as the large.

Such an association for street railway accounting met in Boston in 1898 and the system adopted then is now in use in over 100 large street railway companies. A standard and uniform system of accounting is of much importance as the standardization of equipment and lines and the benefits accruing from it will be found to be as great.

Paper read at Convention of Penna. State Tel. Assn. at Harrisburg.

OVERTURES DENIED.

THE Central Union Telephone Company has sent representatives into Montgomery County, Ind., to make overtures to the farmers' telephone companies. The purpose is to connect up these lines with the Central Union toll system. The overtures have not been accepted, as the farmers' companies remember that a few years ago the Central Union Telephone Company did all in its power to prevent their organization and the conducting of business. The farmers' lines prefer the Independent toll system and will not co-operate with the Central Union.

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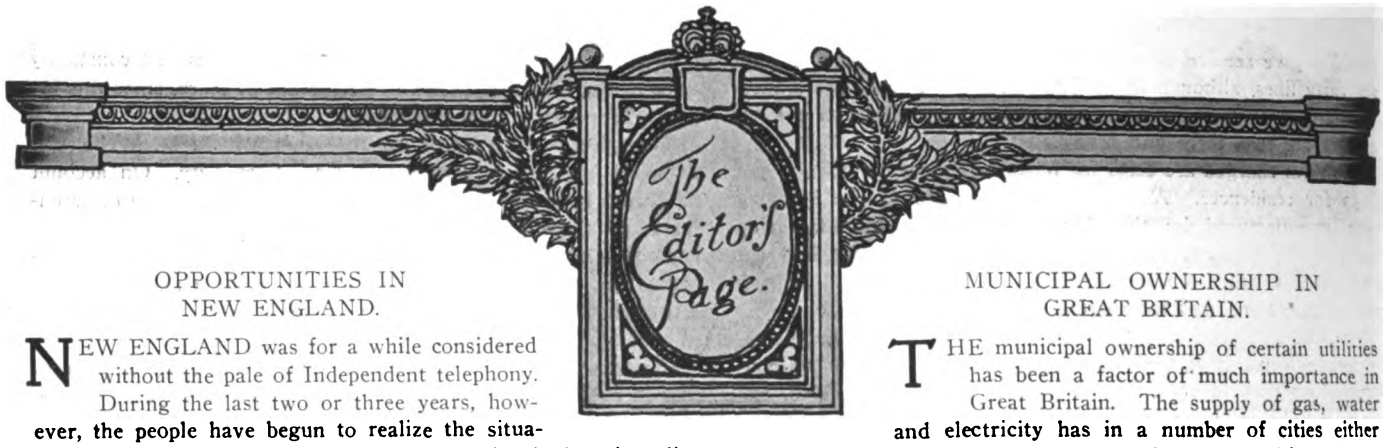

OPPORTUNITIES IN NEW ENGLAND.

NEW ENGLAND was for a while considered without the pale of Independent telephony. During the last two or three years, however, the people have begun to realize the situation which had become untenable years previously in other districts. It might be supposed that being the home of the Bell that in the matter of service nothing could be desired. Such is not the case, for there are a large number of New England towns in which the Bell service is worse than in any other part of the country. Grounded lines are common, old Blake transmitters abound, and the rates are kept up to the highest possible figure. These being the facts, it is not surprising that the people, realizing the benefits that had accrued to other communities through the advent of Independent telephony, should have espoused the cause wherever possible, and to-day there are upwards of two hundred Independent companies in operation. That there are not a much greater number is due to the well-known news bureau tactics which have been the Bell's most valuable stock in trade.

The opportunities for further development are unequaled. The large number of manufacturing cities so closely situated; the demand for telephone service at reasonable rates, and the necessity for up-to-date apparatus makes this field an extremely promising one. In conjunction with local systems toll lines are needed to join together the various interests so that a more formidable front may be made to the enemy.

Portland, Me., is an illustration of the possibilities open to progressive Independent companies. The system of the North Eastern Telephone Company has been in operation only a short time, but has some 3,000 subscribers. The company recently sent out a circular letter requesting opinions upon its system, and in almost every instance the replies received were enthusiastic in praising the service, and only a very few had any words of favor for the Bell.

In the State of Maine there are 75 Independent telephone companies. Massachusetts has only 37, yet in every way it is a much better field. Lynn, one of its most important cities, has no Independent system. Here is an opportunity for development. There are numbers of other places that could be mentioned, but this illustration will suffice to draw the attention of the Independent operators to a field which bids fair to equal any so far exploited.

TO FIX EXTENSION RATES.

CORPORATION COUNSEL TOLMAN, of Chicago, will be asked for an opinion as to the right of the city to govern the charges made by the Chicago Telephone Company in making service extensions by means of switchboards and desk transmitters. The opinion is asked by the council committee on gas, oil and electric light in consequence of an order introduced at a recent session of the council. According to Alderman Blake, the ordinance of 1899, under which the company operates, made no provision for the rates to be collected for improved service by means of the private switches. Many complaints have been made that the charges are extortionate.

According to the officials of the Chicago Telephone Company a charge of $36 annually is made for every trunk line, and $12 for every terminal line for all switchboards. No switchboard, however, will be installed unless two trunk lines are paid for. The operator of all switchboards is paid by the subscriber and all changes and removals from one place to another of all telephones are paid for by the subscriber.

MUNICIPAL OWNERSHIP IN GREAT BRITAIN.

THE municipal ownership of certain utilities has been a factor of much importance in Great Britain. The supply of gas, water and electricity has in a number of cities either been operated or controlled by the municipal authorities. Quite recently the subject of telephone service has been brought before the city councils, and it bids fair to bcome another of the public service institutions under control of the administration of towns and cities.

There is, however, one drawback to this wholesale ownership by the corporations of the various British towns, and that is that the telephone is considered as a government monopoly and consequently comes under the control of the General Post-Office. The head of that department in his annual report stated that no new permits had been issued for the establishment of municipal telephone systems during the past year, from which the conclusion may be drawn that in the future the telephone will be directly in charge of the government in a similar manner to the telegraph.

Whether the municipal authorities are able to conduct a telephone system as well as a private corporation is doubtful, and can only be determined through experience gained over a long period of time. Because the first results show a saving in cost and operation, it is not certain that as time goes on the returns will be adequate to take care of depreciation in the plant or to allow for the application of more modern principles to its operation.

At the present time municipal exchanges are in operation in Glasgow, Brighton, Portsmouth, and Swansea, and one is under construction in Hull. Of these Glasgow has the largest list of subscribers, it being in the neighborhood of 11,500, with an average revenue per telephone of $21. From this the post-office royalty of 10 per cent. must be deducted before applying the surplus to funds for depreciation, interest, and the sinking fund.

In Brighton the system includes some 800 odd subscribers, but is in competition with a private corporation. The system in Portsmouth was started in March, 1903, with a flat rate of $28.61 for unlimited service and an average income per telephone of $17.54. Although it is reported there was a surplus of $11,095 after paying all fixed expenses, yet if expansion, such as might be expected, took place it is doubtful if the following years will show as good results.

At Swansea the system has not been in operation a year, so that no data is obtainable. So far 750 subscribers have been secured and additional orders have been received to bring the total up to about 1,000. The exchange which will be opened in Hull in the near future has secured a prospective list of 1,000. The rates will be $30.68 for unlimited service, $28 for second and subsequent connections, and $14.61 for measured service with an additional charge of two cents for each outgoing call. This latter class of service seems to be increasing in favor, and since it offers another solution to the question of measured service the result of its use should be carefully watched.

Of these cities all of them have a population of over 100,000, and in Glasgow it is in the neighborhood of a million. Comparing these figures with the number of telephones it will be seen the proportion of subscribers is much lower than in this country. If the development is as rapid as it has been here no matter how bright the outlook may be now, to the future alone must we look for confirmation of the advisability of municipal control of the telephone industry.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

RECENT DECISIONS ON ABUTTING OWNERS.

Will you please let me know if any decisions have been made on the question of whether a telephone company is liable to damages for setting a pole and anchoring it in front of a man's premises. We have a suit against us at this time by a property owner near whose gate we set a pole and anchored it with guy wires. He asks $150 damages and abatement of the nuisance.

If you have any decisions along this line, I would like to have them.

U. T. Co.

THERE have been a great many decisions upon the question to which you refer; some of them holding one way and some the other. One rule is that if the fee to the highway is in the adjacent owner, the use of the highway only for the purpose of public travel having been granted, then the erection of poles and wires of the telephone company will constitute an additional burden, but if the fee is in the public, then there can be no valid objection to the grant by the public to the telephone company to so construct its line. This is the rule in Illinois, Kentucky, Kansas, Maryland, Mississippi, New York, Ohio and Virginia.

The other rule is that poles and wires of the telephone company are not an additional servitude on the highway and entitle the abutting owner to compensation. This rule is followed in Indiana, Massachusetts, Michigan, Minnesota, Missouri, Montana, Pennsylvania and South Dakota.

The following are some of the most important cases upon the latter rule: Kirby v. Citizens' Telep. Co. (S. Da.), 97 N. W. 3; McGee v. Overshiner, 150 Ind. 127, 49 N. E. 951; Irwin v. Great Southern Telep. Co., 37 La. Am. 63, 1 Am. Elec. Cases 709; Pierce v. Drew, 136 Mass. 75; People v. Eaton, 100 Mich. 200; Cater v. Northwestern Telep. Exch. Co., 5 Am. Elec. Cases; Julia Bldg. Assn. v. Bell Telep. Co., 88 Missouri 258; Hershfield v. Rocky Mt. Bell Telep. Co., 12 Montana 102; York Telep. Co. v. Keesey, 6 Am. Elec. Cases 107; see also Rocky Mt. Bell Telep. Co. v. Salt Lake City R. Co. (District Court, Utah Ter., 3d Judicial District, 1889), 3 Am. Elec. 356.

DAMAGES FROM CONDUCTION.

Recently the Electric Light people installed in their underground ducts some common insulated wire with poor insulation. It was not intended for any such purpose and the negative side leaked into the ground. They made a test and found that in three blocks the leakage was 15 amp. We have a telephone cable in the same alley in a duct about three feet distant and our cable was destroyed. We maintain that they are liable for the destruction of the cable in that they are not using material that will protect others. "They maintain that we cannot hold them responsible. That others are using the same thing in other cities and do not suffer." One thing is certain, if they use that kind of work and have leaks, as they will have, we cannot operate a cable unless we insulate the whole cable from the ground, and that is impossible.

Please discuss the question as fully as you can. L. Tel. Co.

THE laws of Wisconsin provide:

> Section 1. It shall be the duty of each and every electric light and power company and of each and every person engaged in the transmission of electrical energy in this State to provide by suitable insulation, guard wires or other means, against injuries to persons or property, by leakage, escape or inductions, of any and every current of electricity.
>
> Section 2. Neglect of any of the above provisions shall entitle the person or corporation injured thereby a preliminary injunction preventing further use of such current until said section has been complied with. Laws of Wis., 1889, Chap. 375.

You are undoubtedly right in your contention that the Electric Light Company is liable for the destruction of the cable, because this destruction resulted from their negligence in not properly insulating their wires. The injury was caused by what is legally termed conduction, which is a discharge or escape of electricity into the earth from the wires or plant of one electrical company, by which the wires of another electric company are affected. The Supreme Court of Wisconsin discussed the question in the case of Wisconsin Telephone Co. v. Eau Claire Street Railway.

This case was an application for the injunction at the suit of the telephone company to restrain an electric light company from operating its road so as to interfere, by its strong currents of electricity, with the use of the telephone system. The injunction was denied, because it appeared that the single trolley system used by the railroad company was the best system known, while the telephone company could avoid injury to itself by adopting the metallic circuit. The court said that the language of the statute seemed full enough to cover the case of the plaintiff, as well as that of the defendant. "The object of that suit is to prevent leakage of electric wires permeating the earth and causing damage to others, and by its terms to prevent the plaintiff from allowing the leakage to escape into the ground, as it does in the case of the defendant, and hence if I am right in this, it follows that, if the defendant was in the wrong in not providing for a safe return of the electricity, that the plaintiff is just as clearly in like position, differing only in the amount of the electricity that is allowed to escape."

The court further said that if the adoption of the metallic circuit on the part of the telephone company was made necessary by the wrongful act of the railroad company, that the telephone company could sue the defendant at law and recover whatever expense was incurred in making the change. Wis. Supreme Court, 1890, 3 Am. Elec. Cases, 383.

LICENSE TAX ON POLES.

THE Supreme Court of Arkansas has passed upon one of the vital questions in telephone law in the recent case of the city of Fort Smith vs. Hunt. The city of Fort Smith granted the Fort Smith & Van Buren Lighting & Transit Company a franchise amounting to a contract, prescribing the terms and conditions on which the company could erect poles in the city streets. The city subsequently passed an ordinance requiring every person and corporation who should erect and use any poles on any of the city streets to pay "as a license therefor, twenty-five cents for each pole." It also required each company to return a statement of the number of poles which it had in the streets, avenues and alleys of the city; and for neglect to return said statement imposes a fine of not less than five nor more than twenty-five dollars. Hunt, the manager of the company, refused to make the statement and was prosecuted for the violation of the ordinance. He was acquitted in the lower court and the city appealed. The company took the position that the license imposed by the ordinance was illegal.

The court held that the ordinance was not invalid as demanding a rental for the use of the streets, but the sum required to be paid was lawfully exacted as a license for the purpose of defraying the expense of regulating and controlling the use of such poles under the police power of the city. The defendant contended that the regulations contained in an ordinance existing at the time of the granting of the franchise to the company were all regulations that could be made by the municipality for the control of the company. The court held, however, that the police power of the city, in respect to the poles, was not exhausted by the former ordinance; nor was it thereby prevented from afterwards prescribing their rules and regulations for the same object, or from exacting a license fee to defray the expense of enforcing the already existing rules and regulations. Neither was the police power of the city divested by the contract between the city and the electric light company.

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IN THE OPERATING FIELD.

THE INDEPENDENTS IN PENNSYLVANIA.

THE Pennsylvania law requires annual statements from all incorporated telephone companies operating within its borders. The secretary of internal affairs has compiled, in his report for 1903, the reports of eighty-seven telephone companies, nine being Bell companies and seventy-eight Independent companies.

The total number of anti-Bell telephones reported in use by seventy-two companies was 62,077, while the total reported investment for these seventy-two companies was $19,839,045, or an average investment of $320 per telephone. The total investment recorded for seventy-six companies was $18,867,822, while the gross income recorded for the same seventy-six companies was $1,352,987, or an average annual gross income of 7 per cent. on each dollar invested. Nearly one-fourth of these competing companies are mutual organizations, not operated for profit in the strictly commercial sense.

BELL SERVICE ILLEGAL IN IDAHO.

DISTRICT Judge Stewart, at Boise, Idaho, recently, in passing on a telephone contract, held that the Rocky Mountain Bell Telephone Company was not legally qualified to transact business in this State, having failed to comply with the new law requiring the filing of articles of incorporationn. The case will be appealed to the Supreme Court. If affirmed the effect will be far reaching, invalidating every contract with the company in this State.

THE TELEPHONE SITUATION IN ALABAMA.

IN the State of Alabama there are upwards of forty-three Independent telephone companies, but these do not cover the entire State; in fact, there are plenty of opportunities for many more. Recently a franchise was granted to Geo. L. Wilson, general manager of the Oconee Telephone Company, of Walhalla, S. C., for a term of twenty years in Pell City, St. Clair county. This is a thriving little town on the lines of the Southern railway, between Amston and Birmingham. A metallic circuit standard construction system will be installed. Work commenced on October 1, and every effort is being put forth to complete the system at an early date. So far fifty subscribers have been secured, with prospects of double that number as soon as the system is in operation. The rates will be $3 per month for business and $2 per month for residence service.

NEW ADVERTISING PLAN.

MANAGER George C. French of the Wisconsin Telephone Company, has just completed an advertising scheme which is making people who fear constables and the minions of the law nervous of nights. It is a reproduction of a superior court subpoena with the difference that the words superior court are changed to superior office, and the name of the judge is taken by that of the manager. The receiver is commanded to appear at the office of the Wisconsin Telephone Company and show cause why a telephone has not been installed in his residence.

Some of the replies which have been received and incidents which have occurred are amusing. One man who had his telephone taken out some time ago because he had failed to pay up though he was being sued, and forthwith hastened to the office and squared the account, asking the manager to keep the matter quiet, for he had never been arrested and didn't want the neighbors to know about it.

The other day Manager French's telephone bell rang and a gentle voice inquired if the manager was in and when she was informed she said, "I think it is very hard of you, Mr. French, to ask me to come way down town when you ought to know that it is impossible for me to leave the house."

"But I don't insist that you should," said the manager, "but don't you think you ought to put a telephone into your residence?"

A letter scrawled in lead pencil was received yesterday which started out as follows:

"We want to let you know that we don't want no telephone in our house, and this settles it."

THE TELEPHONE AT THE AUTOMOBILE RACE.

TO prevent the troubles incident to reporting by telephone, which occurred during the Gordon Bennett race in Germany, the committee in charge of the recent automobile race on Long Island, N. Y., made arrangements for telephonic communication, the details of which were placed in the hands of a competent engineer.

The timers had their own telephone system, connecting the official stand with the timers located at the two controls, one at Hicksville and the other at Hempstead.

In addition to this elaborate system the judges had a system for their own use connecting with various points on the circuit, particularly at the four turns—Jericho, Plain Edge, Queens-Hempstead and Queens-Jericho.

These systems required 500 miles of wire. To guard against breakdowns four inspectors and repair men, mounted on motor bicycles, were located at each of the four turns.

WEATHER BUREAU UTILIZES THE TELEPHONE IN TENNESSEE.

THE United States weather bureau is planning to have all reports from Tazewell, on the Powell river, and Speers Ferry, on the headwaters of the Clinch river, made at the Chattanooga office of the bureau by telephone, as all the reports from the upper headwaters are received. The local office has referred the matter to headquarters at Washington, which is considering the advisability of having the reports made here via Knoxville.

THE TELEPHONE IN A LUMBER REGION.

A RECENT innovation which is greatly appreciated by the lumbermen in the vicinity of the Kennebec river in Maine is a telephone line which runs from the Forks of the Kennebec through the deep woods to Moosehead Dam and up the Dead River. By means of this telephone service, the pitch of water and the movements of logs can be made known and controlled, whereas formerly when it was desired to have the gates of the dam closed or log-sluicing stopped it was necessary to send messengers through the woods—a long and hard journey, with the messenger often arriving too late to do any good.

NEW SYSTEM FOR AMSTERDAM, N. Y.

THE Amsterdam Automatic Telephone company is entirely reconstructing its system. The growing demands for extended service caused the directors to decide to install a modern system which would be able to take care of the needs

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of the city for a number of years to come. A complete aerial cable plant is being installed by Le Roy W. Stanton, which will have an approximate capacity for 1200 circuits.

The contracts for the switchboard and apparatus will be let on Oct. 20, and call for a common battery switchboard, 1080 lines installed with an ultimate capacity of 3,000. It is estimated the work will be completed and the exchange in operation by Jan. 15, 1905. A novel feature in conjunction with the system is that auxiliary power for the charging machines will be furnished by a turbine of the Pelton wheel type. The water pressure is secured from a pipe line coming from the Adirondack mountains. The service will be of three classes, direct wire, and two and four party lines. This system, when completed, will be one of the best in New York State, and will be able by means of trunk and toll line service to reach almost every Independent system in the State.

CONVENTION CALL OF INTER-STATE INDEPENDENT TELEPHONE ASSOCIATION

LOUISVILLE, KY., September 8, 1904.

DEAR SIR:—

The next annual convention of the Inter-State Independent Telephone Association of America will be held in Chicago, December 13, 14 and 15, 1904, and not at the World's Fair, because the business to be transacted is too important to be interfered with by sightseeing.

Our next convention will be the most important in the history of Independent telephony.

The special committees appointed at the last convention, and empowered to act on questions of vital importance, have worked diligently all this year, and their reports at the next convention will be conclusive evidence that they have accomplished more for the general good, permanence and protection of the Independent movement than any and every thing that has been proposed or accomplished.

Every Independent operator in the United States is personally involved and financially interested in the work of these committees and must be present to hear the reports, and endorse the work they have projected.

Certain manufacturers determined a year ago to try to kill the Inter-State Association, but failed to accomplish their aim at the last convention. Now they are suggesting and proposing all sorts of schemes, viz.: the formation of a new association, etc., etc., all of which can mean but one thing, and that is they can not control the Inter-State Association, and are trying to prevent the special committees from accomplishing the work indicated and outlined at the last convention.

We operators must stand together and attend to our own affairs.

Please sign enclosed application for membership if you have not already done so, and return same with $5 to cover your dues, so you will be prepared to take part in the work of the next convention.

Respectfully,

H. A. BARNHART, President.
E. M. COLEMAN, Secretary.

REORGANIZATION BRIEFLY OUTLINED.

Statement of plan outlined and adopted by the Special Committee, appointed at the last Annual Convention of the Inter-State Independent Telephone Association of America:

1st. To incorporate the Association, without stock, for the purpose of co-operation and protection, and not for profit.

2nd. To open regular permanent Headquarters, to be the office and center of the Association, and to which all members shall have access, both in person and by mail.

3rd. To establish in said Headquarters three distinct Bureaux or Departments, as follows:

1st. INFORMATION AND STATISTICS.
2nd. PROMOTION AND PROTECTION.
3rd. UNIFORMITY AND STANDARIZATION.

The object in establishing the first Department is to thoroughly gather all possible data, as to investments, construction, equipment, rates, etc., from every company in the United States.

Then carefully compile and tabulate all such statistics.

Then prepare maps of every county and State, showing the location of every Independent exchange and toll line in this country.

All such statistics and maps to be furnished only to the members of the Association.

The object of the second Department is to furnish such information and assistance, as is possible, in any attempt of Independents to enter new fields, and to more effectively hold the territory already occupied by the Independents, against any attack of the Bell Co.

The object of the third Department is to encourage in all possible ways the adoption of only the best high grade apparatus, modern substantial construction, uniform rentals and tollage, all of which is absolutely necessary and exceedingly important to the Independent movement generally, and essential to each operating company especially.

To enable the Inter-State Independent Telephone Association to successfully push the work outlined, we have incorporated the Association and devised a plan to finance the Association, as indicated in the enclosed Membership Agreement, which we urge you to sign at once.

H. A. BARNHART,
C. E. HULL,
E. M. COLEMAN,
O. REX.
SPECIAL COMMITTEE

MEMBERSHIP APPLICATION AGREEMENT.

To the Inter-State Independent Telephone Association of America:

Application is hereby made for a five years' membership in your Association in compliance with the provisions of your By-laws, which fix annual dues at $5.00 per year, payable on or before the first day of April of each year, the same to be applied to the general expense necessities of the Association.

This membership is taken with the explicit understanding that members are to have the full co-operation and assistance of the said Association in all complications which may arise in their business, involving the general welfare of Independent Telephone interests. And it is further agreed that in the event the annual dues should prove inadequate at any time to fully protect the general interests of the membership of the Association, then the Executive Board is authorized to levy a minimum assessment to meet the emergencies, the same to be based on a uniform rate not to exceed one cent per telephone in use, and ten cents per pole mile toll line, of all property owned by members of the Association.

And it is further agreed and understood that all members will report at once, to the Secretary of this Association, details of any danger which may threaten the Independent Telephone interests; that members shall have free and prompt advice from the Association on all questions affecting the general welfare of the Independent Telephone business of the country, and shall have access to all statistics compiled by the Association, and full membership, with authority to sit and vote in all regular and called meetings of the membership of the Association.

Enclosed find $5.00 in payment of annual dues for this year, and on receipt of which please forward certificate of membership to

Name of Co.....
Officer .....
P. O.....
State .....

Dated.....*190*.....

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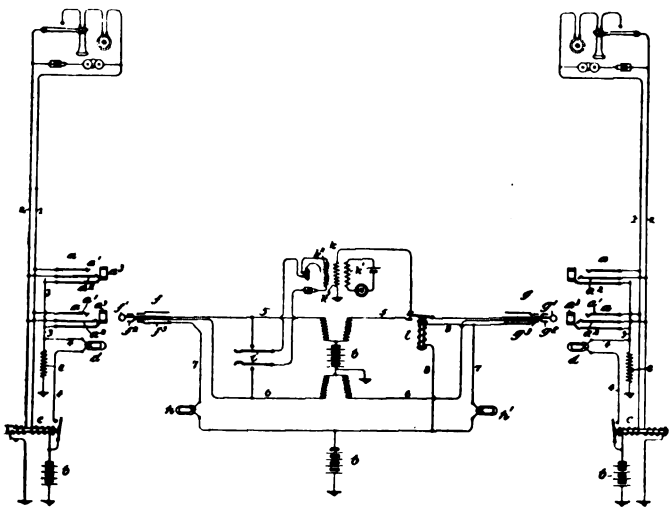
TELEPHONE PATENTS

COMMON BATTERY SWITCHBOARD CIRCUIT.

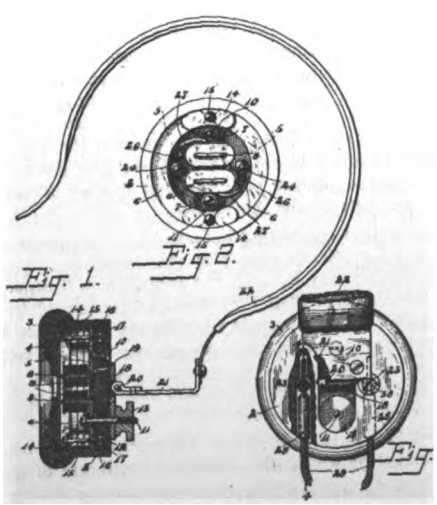
F. R. McBerty, of Evanstown, Ill., patents (No. 796,760) and assigns to the Western Electric Company, of Chicago, Ill., a common battery switchboard circuit. The object of this invention is to so arrange the switchboard circuit that the



operator shall not accidentally flash the signal lamps and thus injure them. The circuit is shown in the accompanying illustration and its operation is as follows: When the subscriber removes the receiver the line relay *c* is excited, closing the local circuit *4* and illuminating the signal lamp, the operator responds by inserting the answering plug *f* uniting conductor *7* with conductor *3*, thereby placing the supervisory lamp *h* into parallel with the line lamp *d*. The resistance of these lamps is adjusted relatively to the battery *b* that when both are in parallel, including the resistance in *e*, neither lamp will be lighted, but if one of the branches is closed there will be sufficient current to light the lamp in that branch, notwithstanding the presence of the resistance, *e*.

TELEPHONE RECEIVER.

R. H. Manson, of Chicago, Ill., patents (No. 769,658) and assigns to Kellogg Switchboard & Supply Company, of Chicago, Ill., an improved receiver. The object of this invention is to pro-



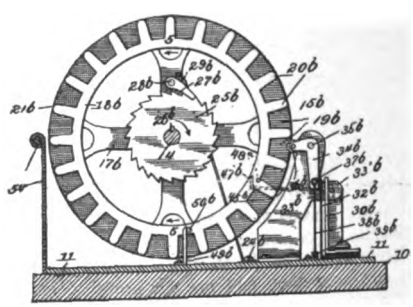
vide an improved receiver of the watchcase style, so constructed that the binding posts carrying the cord terminals are placed entirely within the case of the receiver, as is shown in Fig. 3. By this means all of the metal portions of the cord are protected and short circuits are prevented. In addition, the general design of the receiver is such as to make the one particularly compact usually portable and comforable for the operator to wear.

SUBSTATION SET.

E. E. Yaxley, of Chicago, Ill., patents (No. 769,125). In this patent Mr. Yaxley sets forth the idea that in some instances the vibrations of the bell of a telephone substation are conveyed to the receiver after it has been removed from the switch-hook and produces a disagreeable singing. Mr. Yaxley's invention consists in providing a damper in the form of a lever, which, when the receiver is removed, comes in contact with the gongs of the call bell and stops their vibrations.

ELECTRIC CIRCUIT CLOSER.

Mr. J. K. Norstrom and Henry M. Graif, of Chicago, Ill., patent (No. 769,228) and assigns to Automatic Telephone Company, of Chicago, Ill., an improved selective signal device. This invention relates to improvements in electric circuit closers especially adapted for the so-called automatic telephone systems. The general features of the device are shown in the illustration. The inventor provides a base plate 10 upon which a rotating disk 5 is placed. This wheel disk rotates freely in one direction and is provided with a toothed wheel and pawl connected by means of a spiral spring which returns the wheel 5 to its normal position after it is once propery set. Upon the circumference of the disk numbers are set which correspond to the contact points 20*b*. A



bell crank lever 34*b* is provided, which operates contact springs 32*b* and 38*b*. When the wheel is rotated left-handedly it raises the bell crank lever away from the contact spring, but when it is rotated right-handedly every tooth which passes the bell crank lever causes it to infringe upon the contact springs and thus close the circuit.

SELECTIVE SIGNALING SYSTEM.

W. S. Burnett, Milwaukee, Wis., patents (No. 768,558) an improvement in selective signaling, based upon the familiar step by step method for making circuit connections at the various substations. The invention is a decidelly complicated one, requiring four pages of drawing for its explanation, and needing more room than our space affords for a comprehensive abstract. We recommend those interested to secure a copy of the original patent.

ANTISEPTIC DEVICE FOR TELEPHONE TRANSMITTERS.

T. R. Owens, of Los Angeles, Cal., patents (No. 768,768) and assigns to H. L. Cutter, of Los Angeles, Cal., an improved antiseptic device for telephone transmitters. The object of this invention is to provide an antiseptic protective device for the mouthpiece of a telephone transmitter. The inventor provides a roll of antiseptice paper which is mounted on a spindle set over the mouthpiece of the transmitter in such a manner that the sheet of paper can travel in front of the mouthpiece. As fast as the paper is used, a fresh supply may be drawn from the roll and the old piece destroyed.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

PILOT LAMP INSTRUCTION CIRCUIT.—(435.)

Can you give me a diagram showing the wiring of the pilot lamp instruction circuit as used in central offices? K. O.

The arrangement of the circuit requested is shown in the accompanying Fig. 435, the jack being located at the manager or chief operator's desk, or being multiplied throughout as many desks as may be desired. Upon the insertion of a listening plug in this jack, the upper contacts are closed and the battery circuit closed through relay *A*, which in turn serves to close the circuit through the relays *B*, which are connected in series and thus light the pilot lamps, one of which is located at each position. The operator thereupon goes in on the instruction circuit and is

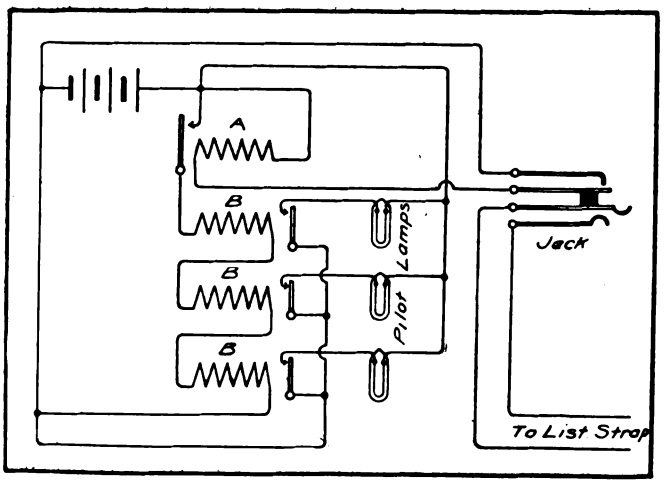

Fig. 435.

given the desired information. As the relays *B* are wired in series it is customary to provide a number of the *A* relays, each of which controls the operation of several *B* relays; for this purpose the *A* relays are connected in parallel and the operation of all of them controlled by the jack.

ROUTE OF POLE LINES.—(436.)

We have secured the right of way for a pole line on the same side of the street as a power line. We also have the opportunity of running the line around another route which is about a mile longer. Our manager says it would be better to do this even if the cost of the line is more, as the other way we would be troubled with noise. Please advise us. J. A. T.

IN our opinion it would be better to take the longer route if there is no possibility of it ever being used by a power transmission line, as you will not be bothered with induction troubles, which are almost certain to occur and will be especially noticeable if the line you propose to construct is used for toll purposes. If you use the route along the line of the power company unless the power line is built high you would need much longer poles to get above it than would nominally be necessary and would cost a good deal more. The telephone lines should not be less than 6 feet away from the power wires. Another important point to be considered is: if your lines have to run above the power lines there is always a liability of danger to linemen climbing up through them and there is the possibility of your lines coming in contact with the power wires and causing serious damage.

RATES.—(437.)

I would like some information as to proper rates to charge for telephone service. We have a magneto exchange of 265 city subscribers, all private lines. Business $2.00, residence $1.00 per month. McClure or common return system is used in the residence districts. I am in favor of raising our residence rates for individual lines to $1.50 per month, making them metallic circuit and also instituting a two-party residence service for $1.00 per month. We have 125 farmers connected with our exchange, thus giving the city subscriber a large territory to get in touch with. I would like to know the prevailing rate in other places, and also whether you consider $1.00 per month for a two-party line high as compared with other towns. G. W. L.

In replying to your query it is exceedingly difficult to answer your question in a suitable manner without more information than that which you convey. From the standpoint of the company it is necessary to arrange rates which will be profitable. The gross income of any company should provide, first, a sufficient amount to cover all operating expenses. Second, a sufficient sum to perpetually maintain the plant in normally working condition, and, third, a sufficient amount to pay current rates of interest upon the capital which is invested in the plant. Upon this basis it will not be difficult for you to ascertain what your gross income should be by calculating operating expenses, estimating depreciation upon your plant at from 10 per cent. to 12 per cent., upon its true cost value and allowing the current legal rates of interest upon your total investments. Having the gross income you can calculate what rates you should charge. If you are operating on the flat rate basis, the flat rate for subscribers would naturally be the gross income divided by the number of subscribers. On the other hand, if you are employing measured service, it would be necessary for you to proportion charges upon the relative traffic of your various subscribers.

NOISY LINE LINE TROUBLE.—(438.)

We have a telephone line 40 miles long that has one grounded line and one metallic line, all No. 12 wire. The grounded line has one telephone 10 miles away, another 30 miles, the third at the end of the route. The metallic line terminates at the switchboards at each end. When the lines get crossed the metallic becomes very noisy. Could we improve matters by tying the three lines together at each end and run them into the board as one grounded line and connect each telephone to the three lines, so as to consider the whole as a grounded circuit? It has been suggested that it is necessary to take down two of the wires and just leave one. Some people say that using the three wires together the current will be split into three parts and die out before it reaches the other end and that it would not be possible to ring over it. We had thought that in strapping the three wires together it would equal a No. 9 wire and therefore would talk better than a No. 12. Can you help us out? R. M. W.

In reply to your query would state that although tying the three wires together would reduce the resistance, yet we do not think that the results obtained would warrant the sacrifice of the two additional wires. From your description we understand the metallic circuit to be a toll line. If this is correct then it is impracticable to place telephones across it. The better plan would be to make the grounded line metallic and tighten up the line wires to reduce the possibility of crosses. At all events, the best solution of your difficulty is to tighten up the line wires and when trouble occurs to send a man out to clear it. The use of iron wire is becoming less every day. Primarily from the fact that high class transmission is only secured by the use of copper wire. From the standpoint of resistance the lengths of your iron circuits do not affect the transmission nor would it be improved by using three wires. There are magnetic properties, which, irrespective of resistance, would cause a poorer quality of transmission than could be secured by the use of copper wire.

CONDENSERS.—(439.)

What is a condenser? R. L.

An article appearing in this issue deals with the manufacture of condensers and the preceding chapter very thoroughly described their operation.

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THE WEEK'S MESSAGES

FINANCIAL.

EDINBURG, IND.—The Citizens' Telephone Co. has increased its capital stock from $3,000 to $9,000.

HOLT, Mo.—The Holt Telephone Company has filed amended articles of incorporation increasing its capital stock from $10,000 to $30,000.

COLUMBUS, O.—The Citizens' Telephone Company of Columbus is now selling $300,000 of preferred six per cent. stock, the proceeds of which will be used for enlarging the capacity of the plant to 8,000 main line telephones and an ultimate capacity of 19,000 telephones. The stock is said to be finding a ready sale.

DAYTON, OHIO.—The Dayton Savings & Trust Company has closed negotiations with the Home Telephone Company, whereby the former has taken all the bonds of the telephone company, amounting to $250,000.

SPRINGFIELD, O.—The capital stock of the Home Telephone Company of Plattsburg, Clark county, has been increased from $10,000 to $20,000, and the system will be extended.

GRANITEVILLE, S. C.—The Graniteville Telephone Company has increased its capital stock $10,000.

LONE OAK, TEX.—The Citizens' Telephone Co., of Lone Oak, has filed an amendment to its charter, increasing its capital stock from $4,000 to $8,000.

FRANCHISES.

LITTLE ROCK, ARK.—The Hazen Electric Light and Telephone Company has applied to the city council for a franchise. It will put in a local and long distance telephone at once and later, if the city desires, will erect an electric light plant. The company was organized a short time ago and has perfected arrangements to go into operation at once.

COLORADO SPRINGS, COLO.—M. H. Spere and H. C. Kusine have been granted a 20 year franchise to conduct an Independent telephone system in Colorado City.

ARGENTINE, KAS.—The Home Telephone Company of Kansas City has been granted a franchise at this place.

ALTON, MO.—The franchises granted the Fosterburg Farmers Telephone Company in Upper Alton and Alton have been formally accepted.

OMAHA, NEB.—A. B. Hunt, one of the promoters of the Independent Telephone Company seeking a franchise in this city, declares that he is determined to keep up the fight until he gets a franchise.

MIAMISBURG, OHIO.—The city council has granted a franchise to the Home Telephone Company.

GEDDES, S. D.—The Geddes Telephone Company which is constructing a line through this part of the state has applied to the local city council for a franchise to establish a system here.

ELECTIONS.

HUGHESVILLE, PA.—The Muncy Creek Telephone Company has elected the following officers: Dr. T. W. Raper, Lairdsville, president; W. S. Opp, of Opp, secretary, and P. W. Opp, of Opp, treasurer. The work of construction of this line will be started at a very early date.

MILTON, PA.—The subscribers for the new telephone company recently met at Lewisburg, and elected the following board of directors: Hon. H. M. McClure, Hon. G. C. Mohn, Dr. James Kleckner, Captain William R. Folemer, and Messrs. William M. Dreisbach, John P. Ruhl and Charles R. Ruhl. The officers of the meeting were: President, Judge McClure; secretary, John P. Ruhl. Mr. A. Brown was elected treasurer for the ensuing year. The company has applied for a charter under the name of the "Buffalo Valley Telephone Company," the capital stock being $10,000.

COMBINATIONS.

FRANKLIN GROVE, ILL.—The deal whereby the Farmers Telephone Company acquires title to all the material of the Lee County Telephone Company has been consummated. This gives the farmers of the exchange privileges hitherto enjoyed by the Lee Company's system.

WARRENSBURG, MO.—J. S. Haley of Independence has sold the telephone exchanges at Warrensburg and Knobnoster in Jackson County and the connecting tolls in that county to the Kinloch Telephone Company of St. Louis. The Home Telephone Company of Kansas City has connections with the exchanges and toll lines sold.

NEW COMPANY NOTES.

BATESVILLE, ARK.—The Batesville Telephone Company has been organized. The officers of the company are: E. H. Glenn, president; G. B. Ortman, vice-president and general manager, and Miss Cora Maxfield, secretary and treasurer.

COLORADO SPRINGS, COLO.—The El Paso Telephone Company has been organized here with a capital stock of $500,000. The officers are H. B. Hames, president; William Gesford, vice-president; C. D. Taylor, secretary, and Robert McReynolds, treasurer. The company expects to begin work at once and will extend the system throughout the State.

COCOA, FLA.—The Brevard County Telephone Co., capital $5,000, has been chartered to build and operate a telephone line from Cocoa to Eau Gallie, southward fifteen miles; from Cocoa to Titusville, northward twenty miles, and to Courtnay, on Merritt Island, ten miles, and south to Tropic, fifteen miles; to lay cables across Indian river and other navigable streams. H. S. Williams. Joseph Paxton, G. S. Hardee, S. S. Jones and R. N. Andrews are the incorporators.

JACKSONVILLE, FLA.—The Jacksonville Telephone Company has been reorganized by the formation of a new company with J. C. L'Engle, Dr. W. Hume Shine and D. T. Gerow as stockholders and officers of the new company. The new company proposes to take charge of the Jacksonville Telephone Company and to newly equip the plant, making necessary improvements and extensions at once. The capital stock of the company is to be $100,000.

ELKHART, IND.—The Pullman Telephone Company has filed articles of incorporation with the secretary of state with a capital stock of $10,000. The company proposes to establish and operate telephones and telephone exchanges in the following counties: Elkhart, Steuben, La Grange, St. Joseph, Porter, Laporte, Lake, Jasper, White, Starke, Pulaski, Marshall, Fulton, Cass, Kosciusko, Miami, Noble, Whitley, Wabash, Huntington, Allen, Dekalb, Wells and Adams. John K. Johnson, M. E. Cram and M. A. Olds are the incorporators.

GREENFIELD, IND.—The Western Grove Telephone Company has been incorporated here with the following directors: W. F. Thomas, J. C. Hamilton, L. J. Burford and Sylvester Jessup.

LA GRANGE, IND.—The People's Mutual Telephone Association, of La Grange county, La Grange; $10,000; has been incorporated by John W. Evans, P. D. Porter, M. C. Miller.

SOUTH BEND, IND.—The Union Electric Manufacturing Company has been incorporated here with a capital stock of $5,000 by James Holstrom, James MacGregor and Charles T. Wade.

WALCOTTVILLE, IND.—The Peoples Mutual Telephone Company has filed articles of incorporation with a capital stock of $10,000. The company will establish and operate a telephone system in La Grange and Noble Counties with the principal office in Wolcottville. Daniel Strayer, Charles Kandall and A. W. Miller are the incorporators.

TOPEKA, KAN.—These new telephone companies have been incorporated: Farmers' Telephone Company, North Branch, capital $5,000; Grove County Telephone Company, Grainville, capital $5,000.

BATTLE CREEK, MICH.—The farmers of the townships of Newton and Leroy have organized a co-operative company for maintaining a system of telephones from farm house to farm house, with the office and switchboard at Newton Center. All of the farmers of those townships have entered into the scheme.

MONTAUK, N. Y.—The New York and Montauk Telephone Company has been incorporated with a capital stock of $5,000. The directors are: E. E. Snedeker of Jamaica and George E. Hippie, L. G. Johnson, M. P. Brainer, Jr., B. I. Schuman, F. W. Miller and James Gregory of Brooklyn.

KERNERSVILLE, N. C.—The Kernersville Telephone Co., capital $5,000, has been chartered here by W. C. Linville, G. V. and M. V. Fulp and A. N. Linville, of Kernersville, and F. W. Lubert, of Waterbury, Conn. The company has authority to establish an exchange at Kernersville and extend its lines into any part of the county.

NORWALK, OHIO.—The Oil Belt Telephone Company has been incorporated here with a capital stock of $25,000, of which $15,000 is 6 per cent. preferred. The incorporators are: Harry E. Graham, C. M. Graham, E. N. Graham, Edelbert Graham and Joseph R. McKnight.

MENO, OKLA.—The Star Telephone Company of Ringwood has been incorporated with a capital stock of $1,000. The incorporators are W. L. Miller and J. S. Juffman, both of Meno.

GRANITEVILLE, S. C.—The Graniteville Telephone Company has been incorporated with a capital stock of $3,500 by W. A. Giles, T. H. Rennie and G. L. Knight. The line will run from Graniteville to Vancluse, Bath and Clearwater.

ORANGEBURG, S. C.—The Orangeburg and Raymond Telephone Company has been incorporated with a capital stock of $10,000 by E. L. Culler, J. G. Smith and W. W. Culler, Jr.

MEMPHIS, TENN.—The Tri-State Telephone Co., capital $10,000, has been incorporated by Chas. D. M. Greer, Jas. T. Warren, Frank N. Fisher, Lewis T, Kavanaugh and A. Outzen. The company is authorized to do a telephone business and to manufacture electrical appliances.

HUBBARD, TEXAS.—The Hubbard City Telephone Co., capital stock $5,000, has been incorporated by C. W. Hobson, A. L. Collins and Hyde MacFarlan.

JACKSONVILLE, TEX.—The Jacksinville Telephone Co., capital stock $15,000, has been chartered to acquire, establish and maintain lines of telephone in and about the town of Jacksonville. Incorporators: W. H. Sory, W. P. Sory, Jr., and M. L. Sory, all of Jacksonville.

LONGVIEW, TEX.—The Lacy Telephone Co., capital stock $25,000, has been chartered here. Purpose, construction and operation of telephone exchanges and long distance lines in the counties of Gregg, Harrison, Shelby, San Augustine, Nacogdoches, Jasper, Panola, Newton, Orange, Jefferson, Wood, Rusk, Upshur, Franklin, Hopkins, Delta and Lamar. Incorporators: J. C. Lacy, Edwin Lacy, J. W. Yates and Jasper Collins.

PINE BLUFF, WIS.—The Pine Bluff Telephone Company has been incorporated with a capital stock of $10,000.

MISCELLANEOUS.

CHICAGO, ILL.—Arrangements have been completed by the Northern Pacific Road for putting into operation a telegraphone service between Pasco, Washington and Junction, North Dakota, using the regular wires of the company. From Pasco to the Pacific coast and from St. Paul to Jamestown the company already has its own telephone wires, so that the 1300 miles of telegraphone wires will fill the gap between the two ends of the company's service between St. Paul and the Pacific coast.

JACKSON, MICH.—J. B. Ware has made a proposition to the regents of the university to install Citizens' telephones at half the price paid the Bell.

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LOWELL, MICH.—The Ctizens Telephone Company will increase both business and residence rates $3 per year. There are now 360 telephones in operation.

RENSSELAER, N. Y.—A representative of the Home Telephone Company of Albany is canvassing Rensselaer for subscribers. The company will operate under a franchise granted some time ago by the city council.

TROY, N. Y.—The report that the Hudson River Telephone Company (Bell) had purchased the Glen Telephone Company of Gloversville and Johnstown is denied by General Manager Hawley. An official of the Glen Telephone company admitted that he had been approached in regard to selling, but he would not say by whom.

UTICA, N. Y.—The Home Telephone Company now has 3,016 telephones installed. The company is paying fixed charges and earning nearly seven per cent. on its stock.

CINCINNATI, O.—After a spirited debate between the members of the Millcreek Valley Business Men's Club and representatives of the Cincinnati & Suburban Telephone Company, regarding the recent increase in toll to the northern end of the valley, the club voted to have all instruments removed from Carthage, Elmwood Place and St. Bernard. The club will petition the councils of the various villages to grant telephone franchises to Independent companies.

JENNINGS, OKLA.—G. S. Van Eman and others will organize a company to establish a telephone system here.

CHAMBERSBURG, PA.—The United Telephone & Telegraph Company has made a proposition to a number of Waynesboro business men looking to the lease of the exchange there to a local company.

CHESTER, PA.—Wire thieves stripped the Keystone Telephone Company's line along Academy avenue, in Upper Darby township recently, securing several hundred dollars' worth of copper wire.

PERSONAL.

G. W. Colton has been appointed manager for the United Telephone and Telegraph Company at Lewisburgh, Pa.

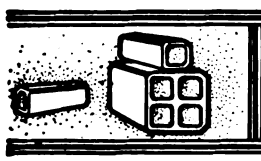
Eugene J. Ellis, county manager of the Sunset Telephone Company, has been promoted to be district manager of a newly formed district, comprising Alameda, Contra Costa, San Mateo, Santa Cruz, Santa Clara, San Benito, San Louis Obispo and Monterey counties and a part of Santa Barbara, with headquarters in Oakland, Cal.

R. C. King has been appointed manager of the Nebraska telephone company's exchange at Wymore, Neb.

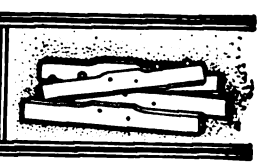
UNDERGROUND.

DUBUQUE, IA.—The Iowa Telephone Company will put its wires underground and will expend $600,000 on the improvement of its system.

NEW CASTLE, PA.—The underground conduit system built by the city is ready for use. The council passed an ordinance compelling all telegraph, telephone and electric companies to place their wires in the conduit.



New Construction in the Field



DECATUR, ALA.—The Morgan County Telephone Co. has completed a line to Trinity and will extend it to Memphis.

AEFLIN, ALA.—A telephone system will be installed here in the near future.

ATHENS, GA.—The Georgia Telephone Supply Co., of Atlanta, will probably establish a local and long distance telephone system in this city.

AFOLKEY, ILL.—The Cedarville-Stephenson County Telephone Company has erected its poles as far as Afolkey.

ZION CITY, ILL.—The council has granted permission to John Alexander Dowie to erect telephone poles and to construct and maintain a telephone line in this city.

INDIANAPOLIS, IND.—The Indianapolis Telephone Company and the new Long Distance Telephone Company will spend $50,000 this season for wire in building toll lines and a quarter of a million in building toll and local lines in the spring.

MUSKOGEE, I. T.—The Pioneer Telephone Co. will construct a telephone system here. Work will commence at once.

MANSON, IA.—P. C. Holdoegel of Rockwell City is remodelling his telephone system at this place and vicinity. It is expected he will spend $4,000 on the system in this section alone and it is needless to say that it will be one of the finest lines in the country. A great many new telephones are being put in over the rural lines and almost every home can be reached in the country by telephone.

WORDEN, KAN.—The Worden Mutual Telephone Company expect to build into Baldwin in a very short time.

MILLBURY, MASS.—A farmers' telephone system will be installed here.

MOUNT SAVAGE, MD.—The Maryland Telephone Company has opened a new toll line to this city.

ACTON, MINN.—The Acton Telephone Company under the direction of H. C. Henderson is making considerable improvement on its lines.

GRAND PLAIN, MINN.—The telephone line to Germantown will be completed this fall.

GREEN PRAIRIE, MINN.—A rural telephone line is to be constructed from New Falls to this place.

HENDRICKS, MINN.—The Lincoln County Telephone Company will install a system here. The company will also soon commence the installation of a system at Idaho.

MADISON, MINN.—The Farmers Mutual Telephone Company recently organized by farmers of Lac qui Parle County has made arrangements for connection with the local exchange. Work will be started at once on the system, which will probably be in operation in a short time.

SILVER LAKE, MINN.—Work has commenced on the new telephone exchange.

WELDON, N. C.—The Home Telephone Company will make improvements to its system here. F. C. Toepleman is general manager.

CANDO, N. D.—The long distance telephone line will be extended north from Cando to Bisbee, Rolla and Perth this fall.

HATTON, N. D.—A new exchange is being installed here.

LEONARD, N. D.—The Leonard Rural Telephone Company is erecting lines out of the city.

WESTHOPE, N. D.—A new switchboard is to be installed here.

COOPERSTOWN, N. D.—The Red River Valley Telephone Company is pushing the work of extending its lines in Clay and Cass counties.

SYDNEY, N. S.—The Nova Scotia Telephone Company will erect a brick building in New Glasgow.

CHATHAM, N. Y.—The Columbia Telephone Company of Hudson will connect with the Chatham Co-operative Company, giving service to Hudson, Mellenville, Philmont, Ghent, Pulvers, Martindale, Crary ville, Hillsdale, Hollowville, Red Mills, Claverack, Humphreysville, Churchtown, Lake Charlotte, W. Taghkanic, Glenco Mills, Livingston, Blue Store, Manorton, Elizaville, Greendale, Nevis, Upper Red Hook, Clermont and Linlithgo.

MIDDLESEX, N. Y.—The Overland Telephone Company is making many new additions to its line plant.

MOUNT MORRIS, N. Y.—Work on the new telephone line connecting the villages of Castile, Silver Springs and Gainesville is nearing completion. The exchange will commence business with about 125 subscribers in the three villages and represents a total of $15,000. Chiefly interested in the new exchange are H. A. Pierce, M. N. Cole and A. B. Windsor.

RENSSELAER, N. Y.—The Home Telephone Company will shortly begin work of erecting its lines in Rensselaer.

SYRACUSE, N. Y.—The Auburn-Syracuse Electric Railroad Company will install a telephone system in conjunction with its road.

BETHESDA, O.—The Belmont Telephone Company will establish an exchange here.

BROWNSVILLE, O.—The Brownsville Independent exchange has seventy-five subscribers in operation and will connect up fifty more within the next month. A toll line is being built which will connect the exchange with the Newark system.

COLUMBUS, O.—The Franklin County Telephone Company is arranging to make a number of improvements in its service outside of Columbus and will attempt to place a telephone at every farm house. At the annual meeting of the company a bond issue of $1,000 was authorized, the money to be used on the proposed improvements.

HAMILTON, O.—The Oxford Telephone Company has commenced work on a number of new lines which will give service to rural districts.

HARPERSFIELD, O.—The Harpersfield Telephone Company has completed its system. It will offer free service from this town to Cork, Trumbull, Rock Creek, Austinburg, Hartsgrove and Thompson unless connections are made from the Madison Telephone Company.

NEWARK, O.—The New Brownsville Telephone Exchange, when completed, will be connected with the Newark Independent Exchange.

CLEVELAND, OHIO.—Secretary F. B. Hoge of the United States Telephone Company stated that before the first of the year Pittsburg will be able to talk to Kansas City for the Independent lines. He said the work of stringing wires over the mountains east of Pittsburg to Philadelphia and Harrisburg is rapidly being completed.

COLUMBUS, OHIO.—The Jackson County Home Telephone Company will extend its lines from Jackson, Pike, Ross, Gallia, Vinton, Lawrence and Scioto counties. Work in the new lines will be begun in the near future.

GENEVA, O.—The Harpersville Telephone Company has reached Geneva, and will give toll service to Ashtabula, Lake, and Geauga counties.

MADISON, OHIO.—The Madison Telephone Company will extend its Geneva line along the South Ridge.

NORWALK, OHIO.—The Oil Belt Telephone Company of this city, which was incorporated with a capital stock of $25,000 will build exchanges at Cygnet, Portage and Jerry City in Wood County with connections and free service with the Independent exchange at Bowling Green. It is estimated that over 150 miles of wire will be strung and 500 telephones installed.

CONNELLSVILLE, PA.—The Tri-State Telephone Company is extending its system. Connection was recently made with the Pittsburg & Johnstown Long Distance Company, giving service with Greensburg. The local company has completed its Flatwoods line and a number of telephones have been connected up. Work is also progressing on the line from Uniontown to Cheat Haven, connecting with the Point Marion Company, giving a direct circuit to Morgantown. The new line to Waltersburg, Smock and Keister will be put in operation shortly.

HOMESTEAD, PA.—The Pittsburg & Allegheny Telephone Company has installed a new switchboard here.

JOANNA, PA.—The new switchboard for the Conestoga Telephone Company will be installed in a short while.

READING, PA.—The Conestoga Telephone Company has replaced its present exchange at this place by one of larger capacity.

SCRANTON, PA.—The lines of the Anthracite Telephone Company have recently been connected with the system of the Consolidated Telephone Company.

APOLLO, PA.—The Apollo Telephone Company will build a new trunk line to Salina and thence to Avonmore.

SPRINGVILLE, PA.—The Peoples Telephone line is building in this place, connecting with other lines above and below.

COLUMBUS, TENN.—The Citizens' Telephone Company has let the contract for building the new line from this city up the Bear Creek Pike to Losea and points beyond. It will also be extended to Hardison's Mill and Rally Hill.

CORNERSVILLE, TENN.—A telephone exchange has been established here and twenty-three instruments connected.

BUDA, TEX.—Work will soon be commenced on a telephone line connecting the inland towns to Buda.

FOREST DEPOT, VA.—Plans are on foot to build a local telephone line from Forest to Perronville, and thence to Lynchburg through the country via Coffee and Boonsboro.

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TRADE NOTES.

THE S. H. COUCH CO., INC., 156 Pearl street, Boston, Mass., has just put on the market a new automatic reset intercommunicating telephone. A bulletin is in preparation which will show the several styles. Cuts can be had now, which give a good idea of its superiority over other makes.

THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Block, Chicago, has brought out a Controller telephone for local battery and magneto systems. It has no crank, but the drop falls when a nickel or token is deposited in the machine. It is now prepared to furnish controllers for any form of system including the automatic exchanges.

THE CONN. TEL. & ELEC. CO., INC., of Meriden, Conn., is making large shipments of its Selective Telephones. This system is very easy to install and is being used by a large number of prominent exchanges throughout the U. S. and is also being adopted by up-to-date progressive country lines. The company will furnish complete particulars on request.

THE CENTURY TELEPHONE CONSTRUCTION CO., of Buffalo, N. Y., has recently perfected an outside cable terminal head which will prove a boon to telephone exchanges. This cable head is moderate in price, and is mechanically and electrically a great improvement over the existing forms of head. An illustrated booklet will be furnished to interested people upon request.

THE F. BISSELL COMPANY, of Toledo, Ohio, has recently issued Bulletin 20 of its perpetual catalogue. This bulletin describes at length panel boards for power and lighting to meet all conditions. The matter of description is very thoroughly carried out. Exhaustive tables which cover every possible feature as to size, price, and capacity form the most important and larger part of the bulletin. To exchange managers interested in electric lighting this bulletin will prove of inestimable value. It can be secured by request.

THE AMERICAN ELECTRIC TELEPHONE COMPANY has recently supplied the United States Government with switchboard exchange equipments for twelve different points. Of these six are being sent to different stations in Virginia, one to Wyoming, one to New York, three to California, and one to the District of Columbia. This indicates a great activity on the part of the government to adopt the telephone. The company also reports a large amount of activity in its sales department, among the recent shipments being the following: Bronaugh, Mo., one 50-line switchboard; Greenwood, Ind., 200-line switchboard; Sheboygan, Wis., 100-line switchboard; Turner, Kans., 100-line switchboard; Oakwood, Md., 100-line switchboard; Sulphur Springs, Ind., 50-line switchboard; South Omaha, Neb., 200-line switchboard; Lancaster, Mo., 100-line switchboard; Algona, Iowa, 100-line switchboard; Hazlehurst, Ga., 100-line switchboard; Platte, S. D., 100-line switchboard; Barnard, Kans., 100-line switchboard; Cass Lake, Minn., 100-line switchboard.

THE AUTOMATIC ELECTRIC COMPANY, of Chicago, has recently issued three new pamphlets, which deal with its automatic system. One of them is entitled "What they say about the automatic in Grand Rapids," and contains some ninety-four letters from subscribers to the Citizens Telephone Company. This company has over 5,500 telephones in operation today and was the first to have 600 or more telephones in opposition to any Bell company. It has recently placed an order for 1,000 more automatic switches to take care of new business. A photograph is included of this exchange. "What Portland, Me., thinks of the automatic telephone" is the title of another of these pamphlets, which also includes a large number of letters from satisfied users of the automatic in Portland. Portland has an exchange of 3,000, having grown to that size from the initial installation six months ago. The third of these pamphlets forms the annual report of the Citizens Telephone Company of Grand Rapids. This report will be of the greatest interest to those investigating the automatic system, as it furnishes a basis for computing the financial success of the system. These brochures are intended to show, not only the success of the automatic from a practical standpoint, but also the increase in business that can be secured by its use. To all parties interested they will be mailed upon request.

MR. FRANK B. COOK has apparently given the lie to the pessimist who stated that there is nothing new under the sun, for Cook's "Universal" Guy Clamp is without chance for an argument, a radical departure from the accepted types of guy clamps. It really seems remarkable that no one had the temerity (or shall we say originality) to depart from the old idea long ago, but the fact remains that Mr. Cook was the first one to make the leap. The result has been an eye-opener to all users of guy clamps. Cook's "Universal" not only takes any size strand from 3/16 to ½-inch, but when it once takes them it holds them. One of Cook's circulars is a reproduction of the Armour Institute's record of some comparative tests which they made of several well-known types of clamp and the figures are startling. They show that Cook's will hold from two to three times as much of a load as the best of the others. Telephone, telegraph, light and power companies have evidenced their appreciation by sending in big orders. The Home Telephone Co., of Los Angeles, recently placed an order for 5,000, the American Steel & Wire Co., 3,000, the New Long Distance Telephone Co., of Indianapolis, 500, the Buffum Telephone Co., Louisiana, Mo., 300, Sheboygan Telpehone Co., Sheboygan, Mich., 500, Indianapolis Light & Power Co., 8,000, Empire Electric Co., San Diego, Cal., 5,000. A canvass of the supply houses shows that practically all of them are handling Cook's "Universal."

FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

WANTED to sell a 200-capacity 160-installed self-restoring drop switchboard of the old Sumter Co.'s make. Board in good working condition. ABBEVILLE TELEPHONE COMPANY, Abbeville, S. C. 258

TELEPHONES FOR SALE—200 American electric series telephones for sale. Price $3 each. All or any quantity. Used a little, but good as new. J. W. TOMPKINS, Middletown, N. Y. 257

FOR SALE—Independent magneto plant in Southern town, 3,500 population; 200 drop switchboard; 150 drops in operation; gross annual income $3,500; fixed expense $1,300; in operation five years; no competition; town and plant growing fast; price, $10,000. Address box 255, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 255

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED to correspond with investor for the advancement of Independent telephone interests in Eastern Iowa. Good territory; small capital. Address Box 250, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 250

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

AN energetic, qualified young man desires telephone position as assistant manager or contract agent west of Kansas City. Has had experience in Colorado. Address Box 252, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 252

WANTED—Position as manager or superintendent of telephone company; East preferred. Eight years' experience as superintendent of largest plants. Best of references. Address Box 248, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 248

WANTED—Bright young man of good appearance, who understands thoroughly technical telephony. One who has worked in the field preferred. Must be able to write descriptive booklets on telephone apparatus. Exceptional prospects for the right man. Address Box 242, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 242

WANTED, you to know that I can wind your coils. If you have any light machine work or models to make, write for particulars. Elmer Burlingame, 406 E. 3rd Street, Peru, Ind. 253

WANTED to buy, parts of self-supporting guy. La Fayette Telephone Company, La Fayette, Ind. 254

POSITION wanted by technical man with eight years' experience in combined electric light and telephone work; at present employed; good reason for desiring a change. Address box 256, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 256

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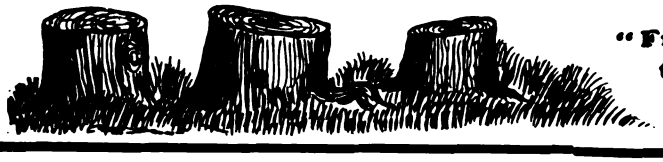
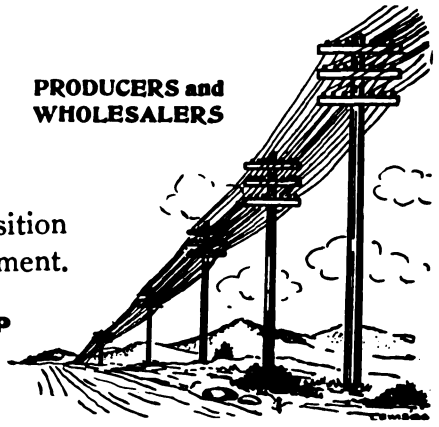


"From the Stump to the Line."



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Marlin Cable Hangers

We can furnish the best.
Prices and Samples upon application.

National Telephone Supply Co.,
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Other Sizes Made to Order

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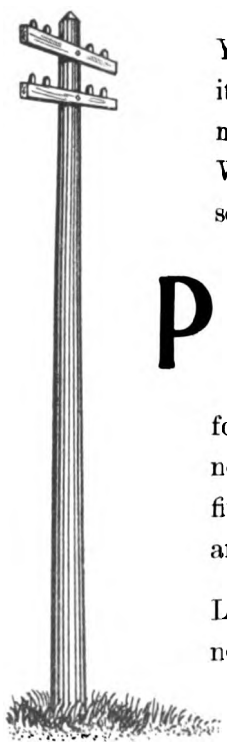
INLAND STEEL COMPANY, First National Bank Building **CHICAGO**



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POLES

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Let us quote prices on your next carload. :: :: ::

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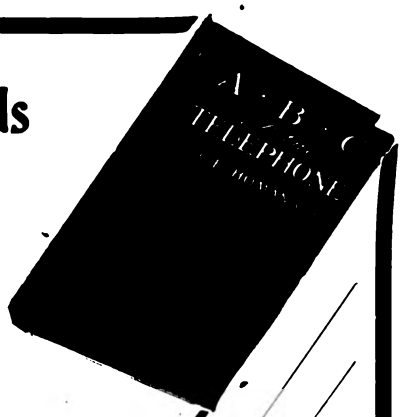
Two Things Every Telephone Man Needs



They are the American Telephone Journal (published weekly), a year's subscription for $1.00, and a copy of the new and revised edition of "The A. B. C. of the Telephone"; a practical book for telephone men. This new edition has been brought thoroughly up-to-date, and sells for $1.00. By a special arrangement we will send a copy of the "A. B. C." and give a year's subscription to the American Telephone Journal—both for $1.50.

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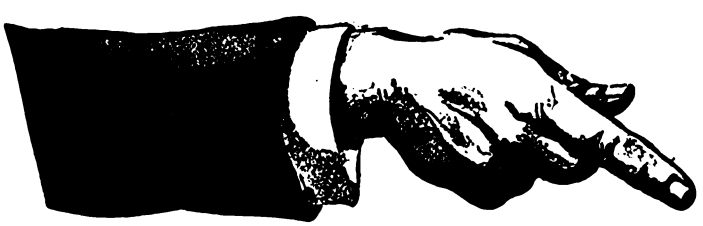

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BY

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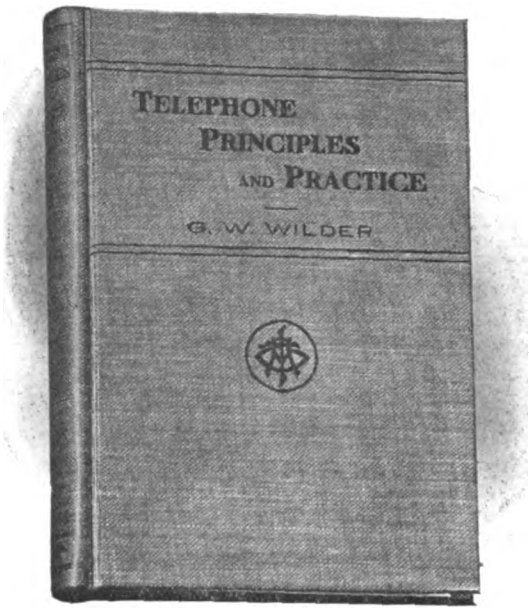

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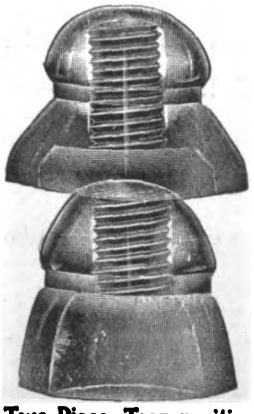

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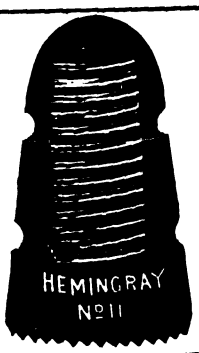

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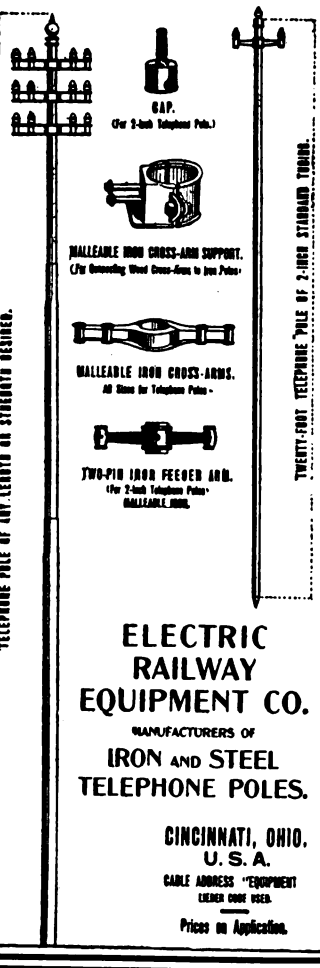

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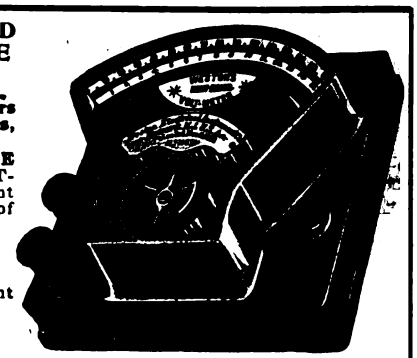

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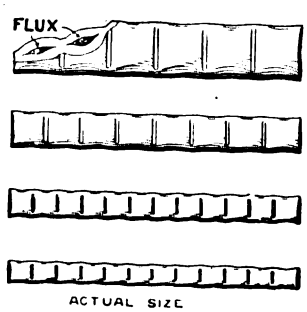

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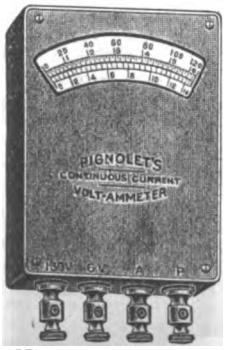

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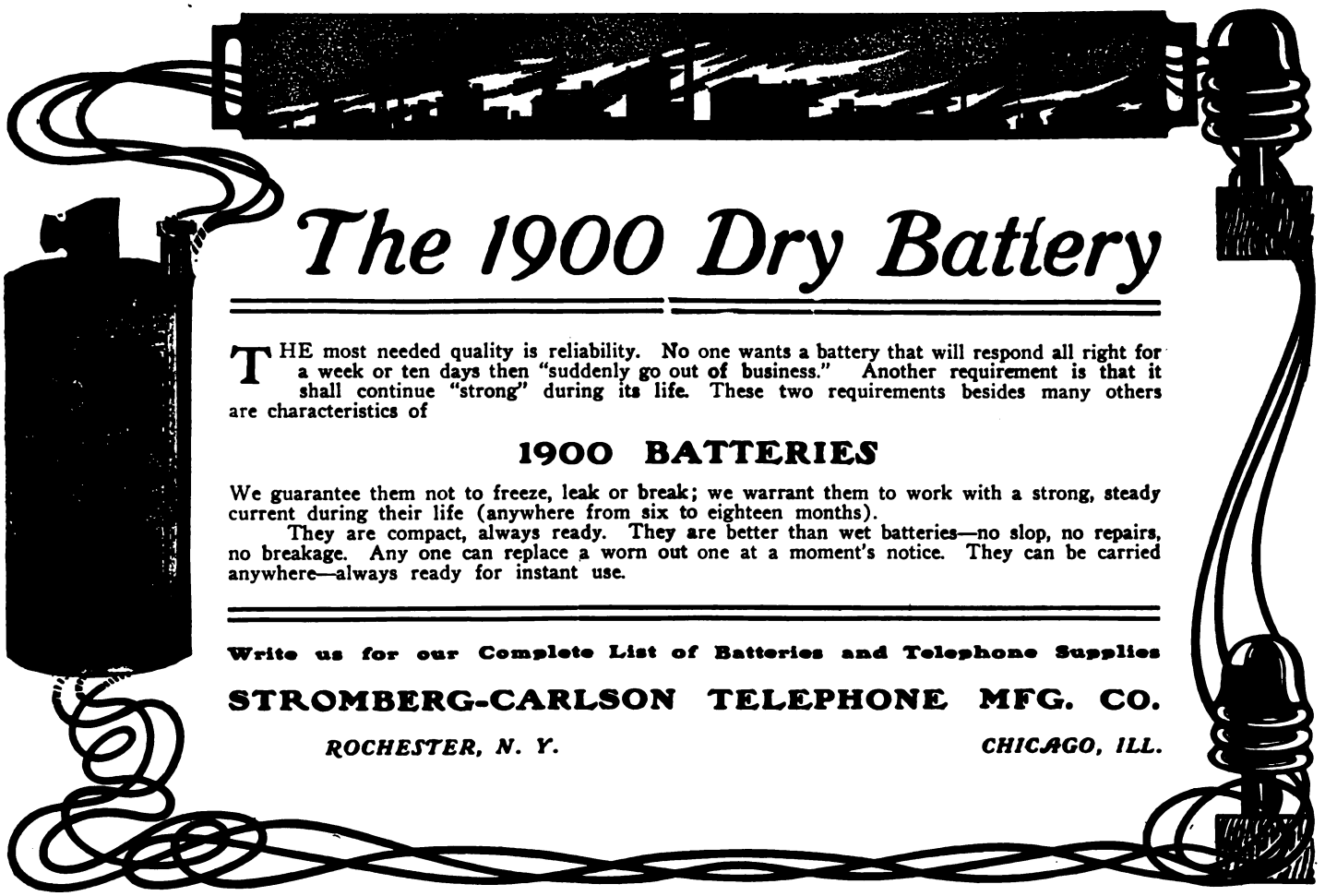

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Combines the **good features** of other conduits. **Eliminates** the **bad features** existing in many kinds. **Has valuable features** not found in any other ducts. :: ::
Made in 7-foot lengths with male and female joints, making construction very rapid and simple, with consequent low cost. :: :: ::
Alignment is perfect and permanent without tedious care and skill required in laying of butt-joint conduits. Users are astonished by the ease and rapidity with which cables can be drawn in, and this without the slightest scratching or injury to the lead covering thereof.
Made in sizes from 1-inch to 10-inch diameter. ::
Bends of any radius and any angle. :: ::
Write us for further information and prices, stating sizes and quantities required. :: :: ::

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OF ALL TEMPERS
Brass Rod, Wire and Tubing

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A book for the telephone man. It is an encyclopedia of useful information concerning telephony.
It gives complete specifications, enabling you to intelligently order apparatus from manufacturers, and to properly supervise the installation of an exchange, large or small.
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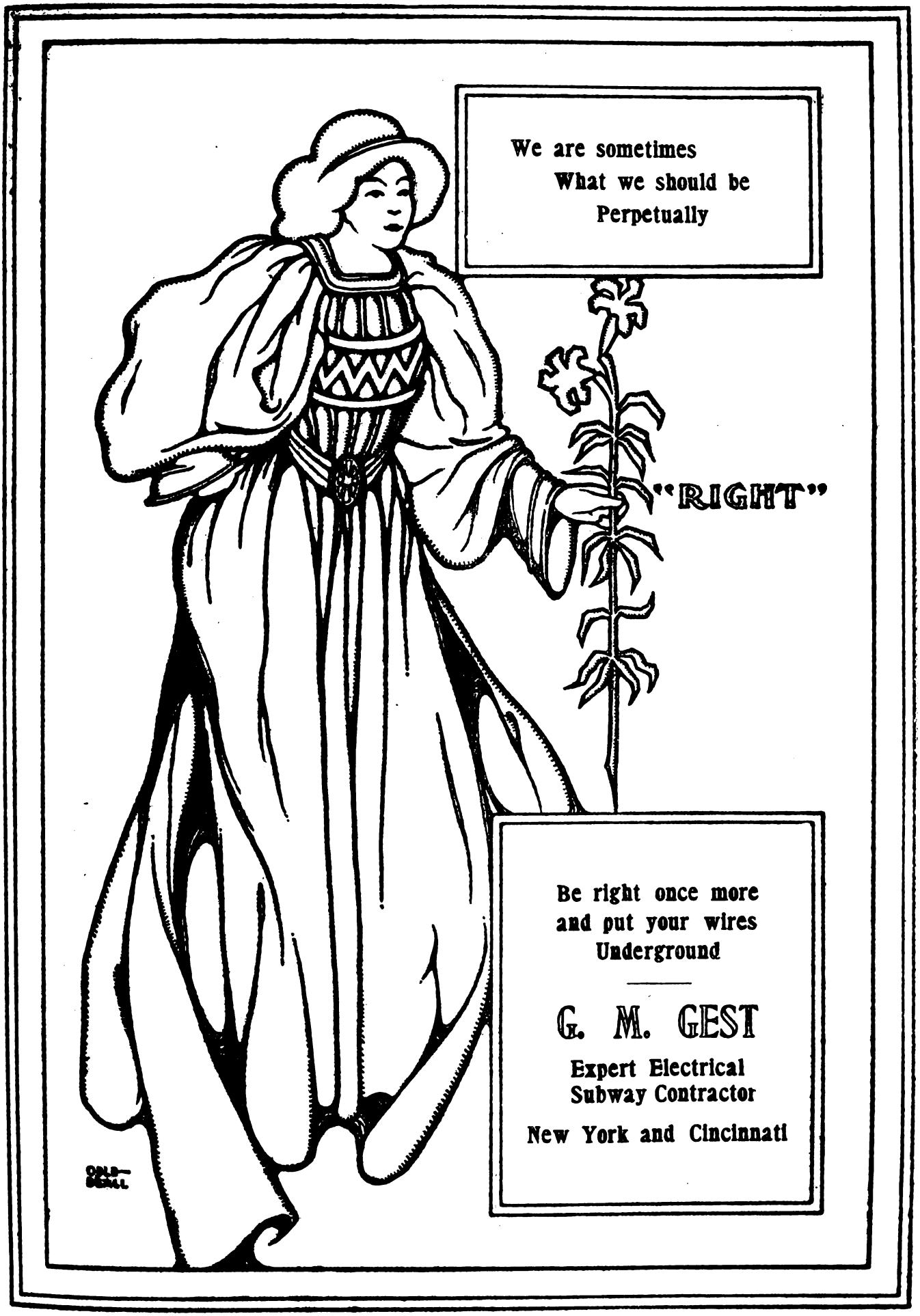

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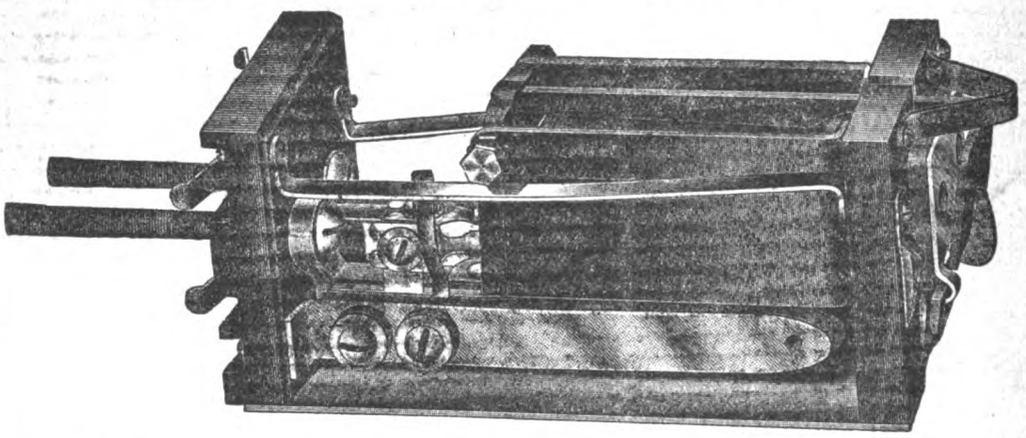
BETTER THAN EVER



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All drops restored to normal position by withdrawal of plugs.

SEE ALSO OUR

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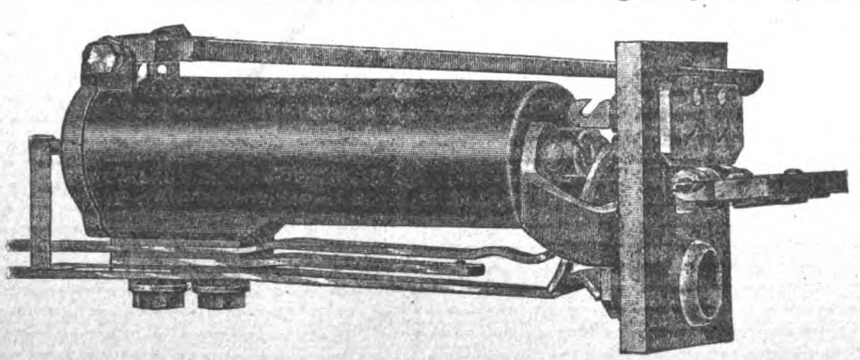
Which are built with self-restoring drops and jacks in banks of 5 and 10.



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> Very truly yours,
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>
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PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—OCTOBER 22, 1904—CHICAGO Number 17

PUBLISHED WEEKLY ONE DOLLAR A YEAR

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THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER

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J. B. RHODES ON THE NEEDS FOR ORGANIZATION

THE TELEPHONE PROBLEM IN LARGE CITIES.....By P. KERR HIGGINS

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INDEPENDENT VS. MUNICIPAL IN BRANTFORD, ONT. — NEW TOLL LINE IN NEBRASKA

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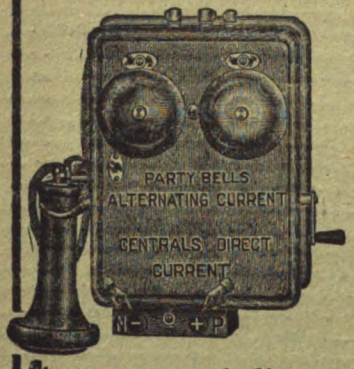

Our Selective Central Relay

used on **generator call party lines** at "**central**" does not respond to alternating ringing current.

Relay responds promptly to very weak **direct** current, either pulsating or continuous, **negative** or **positive** as desired.

Relay is simple, only three moving parts.

Relay is adjusted by a hanging weight, similar to the movement of a clock pendulum.

Relay responds to a very small fraction of the current necessary to operate a **bell** or **drop** or ***any* iron core** signal receiving apparatus of similar nature.

Our system operates on Single Wire Ground Lines, Straight Metallic or "Divided Circuit" Metallic Lines.

You can use the **telephones** and **switchboards** you now have.

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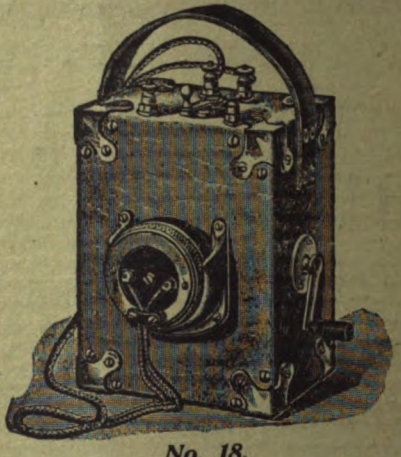

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LIGHTEST AND MOST COMPACT TEST TELEPHONE MADE

Every up-to-date Telephone Man should have a copy of our new No. 8 Catalog.

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Put our X-P Condenser in your Bridging Telephones and your troubles cease.

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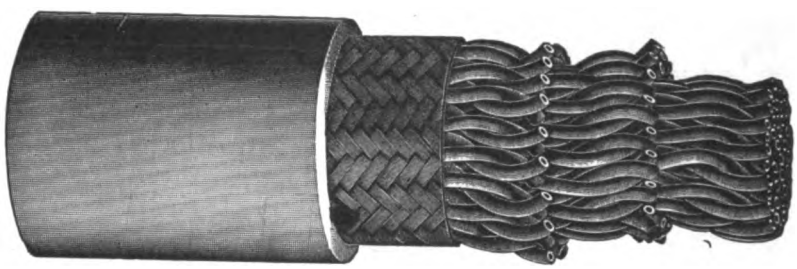

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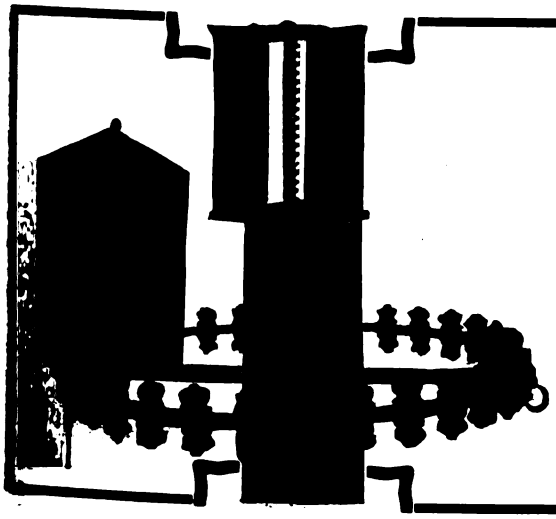

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WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***
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Regardless of Price, Is What Our Customers Demand

PERFECT PARTS FOR THE PERFECT TELEPHONE

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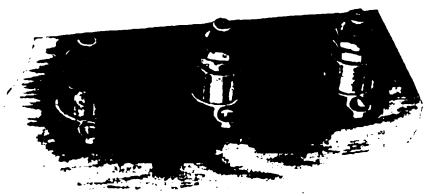

EFFICIENT

Our No. 20 -- ARRESTOR

Machine-made binding posts fitted with two hexagon nuts. Carbons are of good size, thus offering a good discharge surface. They are held under constant pressure between springs, but can be readily removed.

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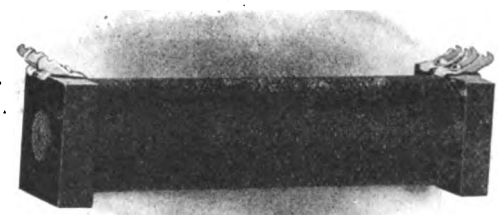

UNIFORM IN RESULTS

Our No. 20-A -- INDUCTION COIL

This coil is used in all our Generator Call telephones. It is manufactured by automatic machinery, thus producing a coil that will give absolutely uniform results. The heads are made of seasoned maple, and are provided with convenient terminal clips. The windings consist of the best grade of copper wire silk insulated.

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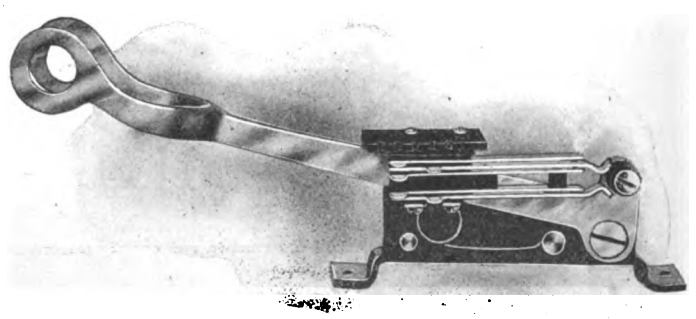

POSITIVE IN ACTION

No. 5 -- HOOKSWITCH

This type of hookswitch operates so satisfactorily that we use it in all of our telephones, simply modifying the mounting plate or frame so it will fit into different styles of telephones.

All this apparatus is fully described in Bulletin No. 11-B

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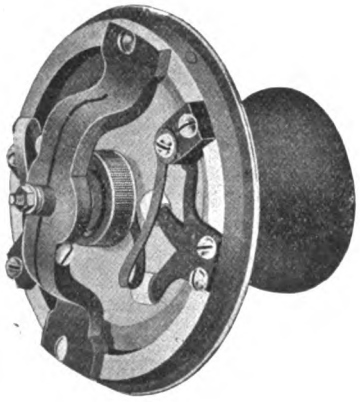
100% GOOD

A Transmitter That Transmits

Electrode Surfaces Are Pure Platinum.



Send for Our Bulletin Number 11.

One that transmits perfectly and does it continuously without giving any trouble.

That is the kind the progressive Exchange Manager is looking for.

The Century Platinum Electrode Transmitter Is that Kind.

Made Only for Perfect Service.
Common Battery or Magneto,
Local or Long Distance.

If you are interested, we would like to tell you more about it.

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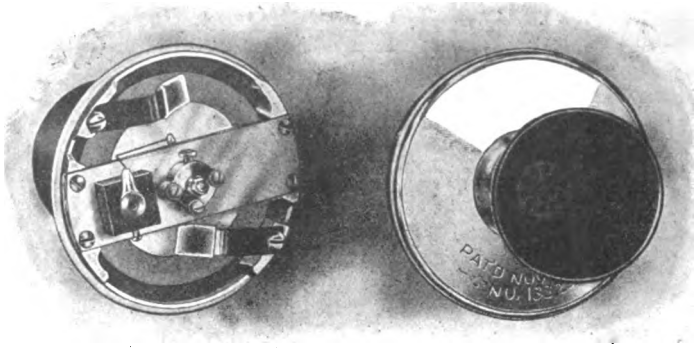
REVERSED "Solid Back" TRANSMITTER

SAMPSON TELEPHONES FOR PARTY LINES
CENTRAL ENERGY TELEPHONES FOR CITY LINES

If you are not using our 'phone with Reversed "Solid Back" you have not got the best.



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Volume
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SUPERIOR
To All Others

Express and Toll Line Switchboards of Any Capacity

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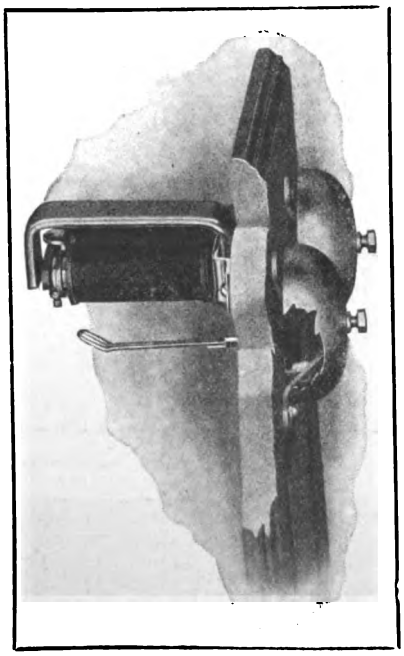

A NEW WRINKLE

STOPS the vibration of the bells as soon as the receiver is removed from the hook. No more need to place the hand to the gongs to secure a quiet line. Simple in construction, positive in operation and can't get out of order. Cannot be seen when door of cabinet is closed. No extra charge. Now placed on All Monarch Compact-Type Telephones. Write for full description and general telephone catalogue. : :

MONARCH TELEPHONE MFG. CO.

10-16 SO. CLINTON STREET, CHICAGO, ILLS.

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Andrae "Giant" Telephones

Connections between binding posts and apparatus in our telephone cabinets are made through tinned copper wire. With the exception of generator connection they are all soldered and securely fastened at joints.

ALL EXPOSED WIRING

Is insulated by soft rubber sleeves. Positive continuity of circuit is assured in transferring wiring to the hinged portion of cabinet. We use a hinge with a flat contact spring. Each end is securely riveted and soldered to the halves of the hinge.

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JULIUS ANDRAE & SONS CO.
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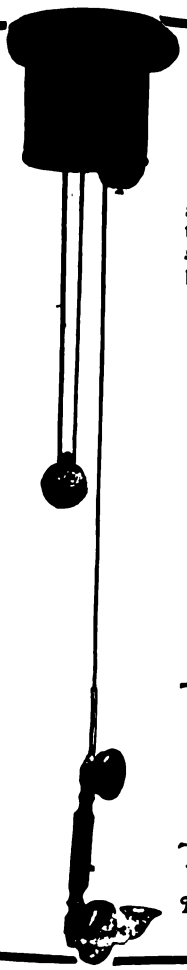

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"Gentlemen:—I had the PENDENT TELEPHONE installed in my office, *and we could not ask for a better.* I personally ordered it for use in our office, and then changed my mind and had a desk set installed, but later had the PENDENT put back. Yours very truly,
"F. D SMITH, Cashier,
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Only a generation ago we knew less about telephones than we now know of airships.

The instrument has not been in use so long that we should have become bigoted as regards type.

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Don't think the oldest must be best —that's fogyism. If we are willing, ***you*** ought to be, to try

The Pendent Telephone

"That hangs from the ceiling."

THE VOUGHT-BERGER COMPANY
Makers of First-award
Telephones, Switchboards, and Appliances
LA CROSSE, WISCONSIN

CORDS AND CABLES

We manufacture Switch-board Cables; also, Cables for interior work, and Cords of every description used in conjunction with telephone work.
WRITE US FOR PRICES.

Runzel-Lenz Electric Mfg. Co.
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Our TELEPHONES are right.
Our Business Methods Clean.
Let us figure on your wants.

EASTERN TEL. MFG. CO.
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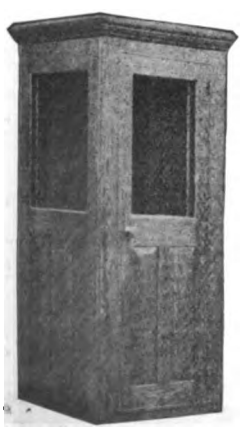

Sound Proof Qualities

Of course, are the first requirements of good Telephone Booths.

But graceful outlines and attractive appearance are essential.

They must also be easy to keep clean.

Long experience is necessary to meet all these exacting requirements. We have the experience, and our principles of construction are strictly up-to-date

Your name and address will bring our catalogue.

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KELLOGG SWITCHBOARD & SUPPLY COMPANY

Green and Congress Streets, Chicago

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For simplicity, satisfactory service and good results, this system takes the lead. The line is perfectly balanced. Each subscriber is called without a chance of disturbing the others. One party can call central without disturbing the others on the line. Absolutely non-interfering. Extremely simple to install, to maintain and to operate. Few changes or additions necessary at the switchboards. Ask for particulars with prices, etc.

We supply party line telephones for common return or metallic circuits, either two or four on a line.

We manufacture a large line of telephones, switchboards and specialties.

Our wall or desk, sets, as illustrated, are growing in popular favor because they are so convenient. Price reasonable.

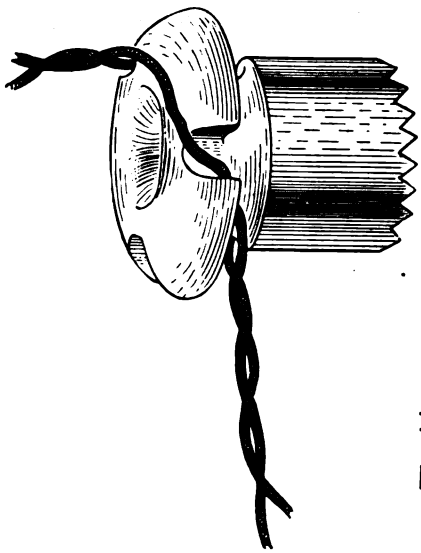
Ericsson Telephone Co.

Manufacturers of

SWITCHBOARDS, TELEPHONES AND TELEPHONE SUPPLIES

296 BROADWAY, NEW YORK

Polk Cut in Knob



No tie wires

Can't pull off.

Can run wires in any direction.

Send for Sample

Price per M $20.00

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TOLEDO, OHIO

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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

NEW YORK OFFICE: 253 BROADWAY.

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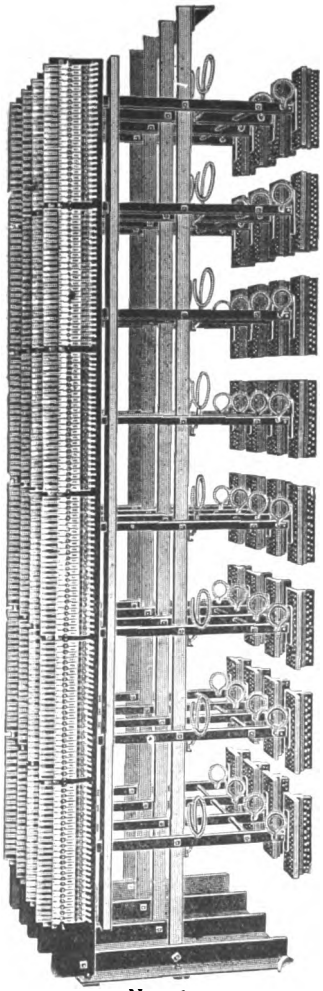

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No. 238.—With Heat Coil and Carbon

PROTECTION

Approved by the Board of Fire Underwriters.

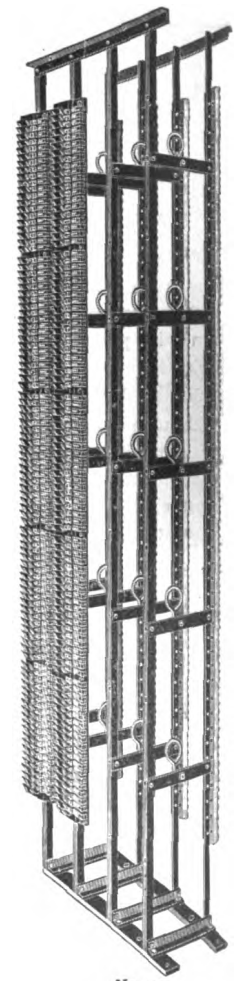
No. 237.—With Fibre Fuse and Carbon

PROTECTION

A Good Low-Priced Frame.

Both equipped with Line Terminal Blocks and Guide Wire Rings.

Sterling Electric Co., Lafayette, Indiana.



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DOUBLEDAY-HILL ELECTRIC CO.

MANUFACTURERS AND DEALERS

TELEPHONE MATERIAL

Pittsburg, :: Pennsylvania

Wire
Cross Arms
Pins

Brackets,
Insulators
Connectors

Lightning Arresters
Fuses, Telephones,
Braces, Bolts, etc.

Highest Grade Lowest Prices Quickest Delivery

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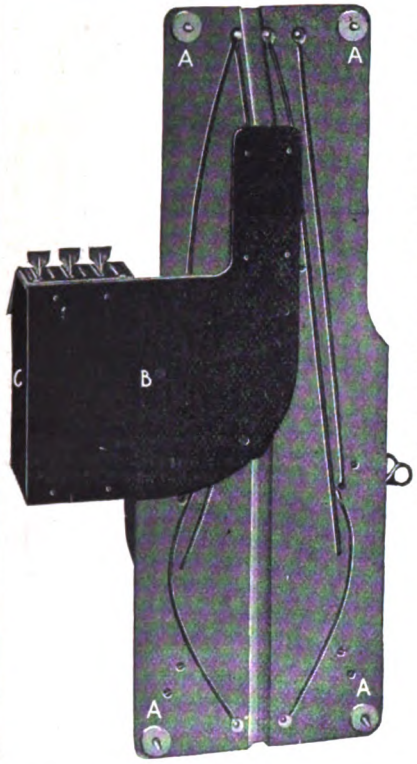

THE most popular method of mounting Baird Pay-Stations is shown in the illustration herewith. We manufacture a great variety of Pay-Stations and Measured Service Equipment.

Write for catalogue and price list.

Baird Manufacturing Company,

4 Michigan Street, Chicago.

Nothing Better Made!

COUCH No. 30 Transmitter

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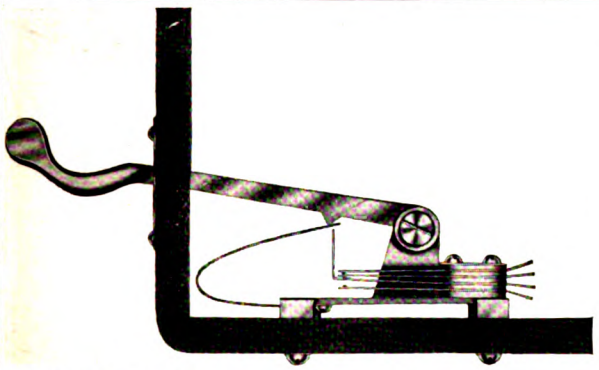

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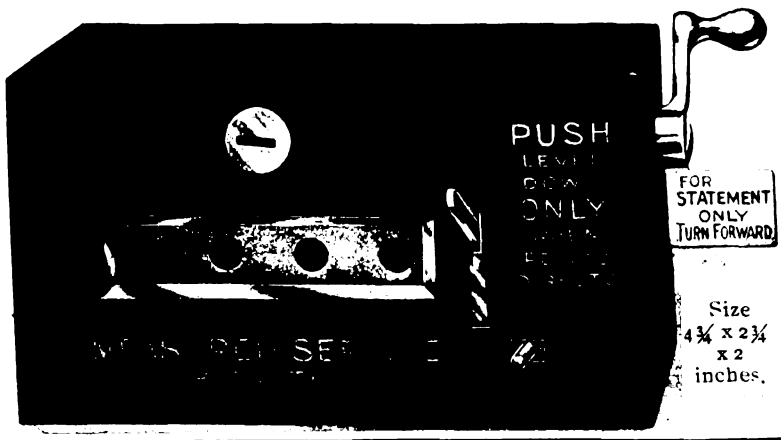

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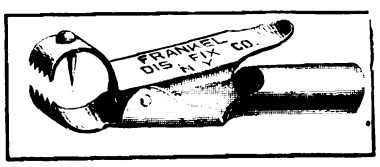

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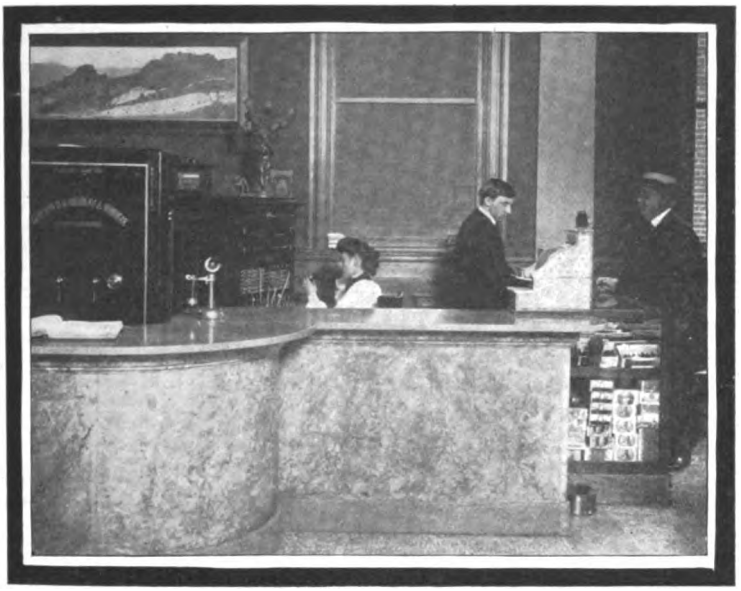
THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER

ARTICLE I.—THE ECONOMICS OF THE PRIVATE BRANCH EXCHANGE.

By Arthur Vaughan Abbott.



Stromberg-Carlson common battery switchboard installed in the Kingsborough Hotel at Johnstown, N. Y. 110 telephones in use. Board is equipped with lamp signals and receives battery from the exchange. Two trunks to the central office.

IT is currently considered that a private branch exchange is an expensive luxury, but this is far from being the case. On the contrary a private branch exchange is one of the most economical contrivances for the subscriber and simultaneously one of the best of income earners for the telephone company, thus quite nearly solving the old problem of having one's cake and eating it. However, it must not be assumed that the private branch exchange is a universal telephone panacea, for on the contrary, there are some cases in which it would be an extravagance and in others a luxury, for like the punishment and the crime of comic opera fame, the private branch exchange must fit the subscriber, otherwise it would be worse than useless.

Experience shows that telephone traffic is by no means a uniformly flowing stream, but like a mountain torrent is full of all sorts of eddies and whirlpools and cross currents of divers natures which flow in and out among themselves in a most intricate and perplexing fashion. Each subscriber has a particular coterie of conversational correspondents with whom he desires to frequently talk, and it is only on rare occasions that he transmits a message outside of this particular group. It is true that the various groups which are tributary to each subscriber are constantly overlapping each other, causing minor streams of conversation to flow between the groups. But it is astonishing how small these intercommunicating streams are when compared with the normal traffic of the group itself.

This tendency is very strongly emphasized when one comes to consider the traffic which arises between a set of people, who from business or other affiliations are particularly closely united. Take the case of the factory for example, having three or four heads of departments, each containing as many more assistants. Each of the chiefs is likely to wish to communicate with all of the others a score of times or more in the course of each day, and much business is in the nature of brief conversations which can be transacted telephonically with just as great facility as by personal interview.

The value of the telephone as a time saver in the transaction of all such business is almost too trite to need reference. If each man's desk is equipped with a telephone, he may pick up the receiver, gain the ear of desired correspondent and transact his affair in the time which would otherwise be occupied in leaving his chair and going as far as his office door. Over and above the mere saving in time is the increased capacity for work which is secured by use of the telephone. The lifting of the receiver for a telephonic conversation hardly breaks in upon the train of thought which would be hopelessly shattered and dissipated were one to transport himself bodily to the office of the correspondent.

Modern business has been quick to recognize these advantages and there are now few cosmopolitan offices whose every desk is not furnished with a telephone. Now it is easy to see that if each such instrument is connected with the

Stromberg-Carlson switchboard installed in the office of the Blade Printing and Paper Company, Toledo, Ohio. This is one of the largest private branch exchanges in that city.

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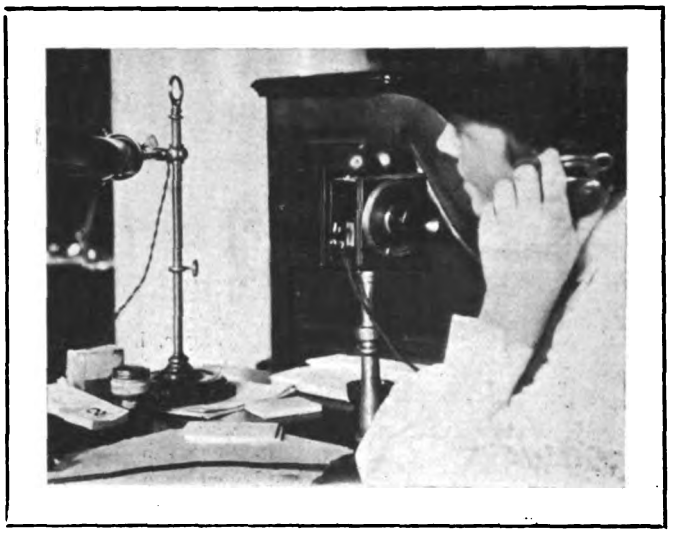
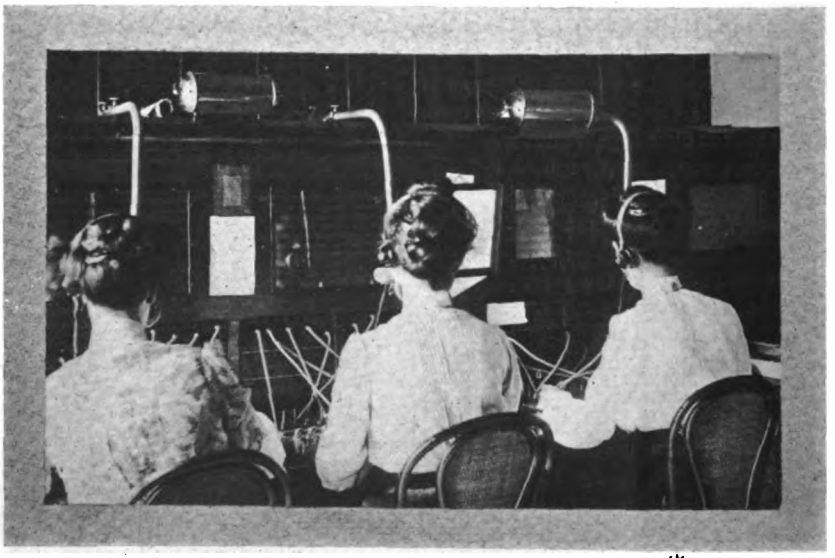
central office, a very large expenditure in the wire plant must be provided, and moreover every message must travel the entire distance to the main exchange and back again to be handled in exactly the same fashion as an ordinary call, even if the two conversants are in adjoining rooms. Of course, this means a very much greater switchboard investment which becomes particularly formidable in the case of multiple jacks.

Operating expense is also decidedly augmented for the traffic of such groups of subscribers is often quite erratic and rises and falls with little regard to the rules and regulations of the normal telephone load line. If the regular telephone line be installed for each employee in a case such as has been described, the bill of the telephone service becomes something enormous. There are few business offices of magnitude that do not require from half a dozen to a dozen instruments while many may need several scores. Based upon the most moderate telephone charges of from $60 to $80 per annum per line, the telephone bill soon rises to the thousands, nor is it possible for the telephone company to mend matters much, because its regular charges are only sufficient to be fairly remunerative after paying operating expenses and interest and depreciation upon its plant investment.



Type of Instrument Used for Interior System of Prudential Insurance Company at Newark, N. J.

The private branch exchange is the solution. A comparatively simple and inexpensive switchboard for small installations is often provided in the shape of a pigeon-hole desk, the necessary jacks and drops or other signals being installed in the space usually occupied by the pigeon-holes, while a portion of the tablet is transformed into an admirable card and key shelf without materially interfering with its usefulness as a desk. The little switchboard is installed in the reception room of the office and then the instruments on each desk connected therewith by lines which, as house wiring, are very short and inexpensive. From the private branch exchange board one or two trunk lines are extended to the central office. These are amply sufficient to take care of all the external traffic, for this is rarely but a few per cent. of the entire traffic which the board daily handles.



Private branch exchange installed in Home offices of the Prudential Insurance Co. at Newark, N. J. At present there are 230 lines installed, of which 66 are for long distance service and 164 are intended for local use in the building only. Eight trunks run to the exchange. Average number of calls daily 2200.

As the board is very simple, no highly trained operating skill is necessary to afford satisfactory service. Indeed, it is common to place the smaller private branch exchange boards in the hands of a stenographer and typewriter or even the office boy, and thus where but few lines are required, office expenses are not at all augmented by the presence of the switchboard. The telephone company can charge an annual rental for the trunk line of about $100, and about $20 per station per annum for each of the telephones and the switchboard.

As a concrete example, consider the case of a ten line board. Upon the single line basis the telephone bill would be, say $800 per annum, which many offices might feel unable to pay. If the private branch exchange be substituted with say two trunk lines, the expense will be about $400 (two trunk lines at $100 = $200 plus 10 stations at $20 = $200). By this means the telephone company has secured $400 annual income which it would otherwise have been unable to get, and it is cultivating the telephone habit which will sooner or later yield a valuable return in the shape of increased demand for service. On the subscriber's part, every desk has its telephone and the internal traffic of the office is as well cared for as if every line ran to the main exchange. Moreover, there are two trunk lines, either or both of which are always at the command of every person in the office without rising from their seats; and all for a rental of half that required on the single line plan.

The example thus instanced is one of very moderate dimensions and it is easy to see that there would be a multitude of cases wherein the saving in annual expense to the subscriber and the economy in the installation cost and operating expense to the telephone company would be vastly increased and the corresponding advantages accruing to both much greater. It is easy to see that as the group of exchanges which the private branch exchanges serves increases, the smaller will be the proportionate cost of installation to the subscriber, because the trunk lines are able to carry a much larger traffic load than individual lines can accommodate without crowding, and consequently relatively fewer trunk lines will be needed to serve a large exchange than would be required for a smaller one, and so the savings in all directions are proportionately increased.

In the preceding calculations, only those advantages that directly accrue from economy in plant and operation have been enumerated. No account has been taken of the increased efficiency which has resulted in the transaction of business and in the saving of much valuable time to those who by means of the diminished expense of traffic service can be accommodated with instruments. It would be impossible to calculate the money saving that thereby results, but experience has universally demonstrated that this saving is really the most important item in the advantages presented by the Private Branch Exchange.

So far the use of the Private Branch Exchange has been largely restricted to the internal advantages which have been presented by enabling members of a single group of subscribers who wish to communicate frequently with each other, but this by no means

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exhausts the possibilities of this class of service. Indeed, many of the larger stores are beginning to perceive that the Private Branch Exchange may become a valuable adjunct by creating a kind of order clearing house whereby their various customers may order goods telephonically. Formerly telephonic orders have been regarded with a certain species of distrust because there appeared to be no means whereby an order could be checked and its responsibility located, but the private branch exchange affords an opportunity of establishing an order clerk who is able to handle the business in such a manner as to locate the subscriber, book the order which is then through the proper channels, filled and transmitted with a C. O. D. bill. Some of the larger firms report a very material increase in their business by means of the superior facilities that are thus afforded to subscribers to purchase goods with a minimum of inconvenience.

The secrecy which the private branch exchange affords for certain classes of communications is also a point in its favor. Take for example a firm of lawyers, one of the partners may be engaged with a client, while another desires information regarding a point in some other case. To interrupt the conference by calling the first away from his client might be exceedingly injurious, yet it is perfectly possible for the second partner to consult the first over the telephone and obtain the desired information without breaking up the interview and in such a manner as to be sufficiently secret. Thousands of similar instances will readily occur to the reader, particularly cases where financial responsibility, credit standing, or similar items of information are desired.

In the summary of advantages, the position which is held by the Private Branch Exchange operator, the importance which this functionary is gradually assuming, must by no means be forgotten. For now the Private Branch Exchange operator is becoming a kind of a chief confident clerk. She must become thoroughly conversant with the habits, ways, wishes and methods of doing business of each of the principals of her firm. She must know when Mr. Smith is likely to be at the office, whether he happens to be engaged with a particular client or not. She must intuitively guess at the nature of the communications which are sent, and know whether Mr. Jones should be interrupted for a telephone call or whether the caller after giving his name should be requested to defer his message until a subsequent time. Again she transacts numerable items of business of various kinds. She purchase theater tickets, engages sleeping car berths, secures railway transportation, ascertains the time of departure of trains, arranges banking transactions, etc., etc., until to the members of the firm the trained operator becomes one of the most important of employees.

Such are a few of the successes which the Private Branch Exchange has already achieved, but as one of the later developments of telephonic art, it is still barely in its infancy, and in the hands of the skilful traffic manager it becomes a most powerful weapon, one of exceeding elasticity, wherewith it is possible to fit the ends of the most complicated group of subscribers and to afford service which is far superior and far cheaper to any other method now known, redounding equally to the benefit of the telephone company and its patrons.

An understanding of its possibilities is as essential to the operator of the small exchange as it is to the large one, for it may frequently make all the difference between success and failure. This is true particularly in small factory towns, in small educational centers and in summer and winter resorts. It requires only missionary effort to convince the factory owner that the private branch exchange will save its cost half a dozen times in the course of a year, to show the college president in the small city that an intercommunicating telephone system with outside connections, means vastly increased efficiency in his institution, to make it clear to the hotel proprietor in the resort towns that the comfort of his guests will be materially enhanced, at very little cost, by providing a telephone in every room. And all these private branch installations, whether in the small town or larger city will double on themselves, so to speak, for with the simplification of telephonic access, will come a demand for service from new quarters everywhere. The shopper, when she finds that she can reach the department sales people in her favorite store through the private branch exchange, will soon see to it that she has a telephone put into her home. The small tradesman will learn that he can save his time and carfare when, thanks to the private branch exchange, he can reach not only the wholesale house, but directly talk to the desk of the man who books his orders. Consequently he will be willing to subscribe for a telephone when without the private branch exchange to serve his purpose at the other end, the service would not be profitable to him. The list showing the value of the branch exchange as a business builder for the operating company might be extended along the lines almost indefinitely, but enough has been shown here to make clear the general proposition. As the series of articles on this subject proceeds specific cases will be cited that will make clear not alone what *may* be done, but what *has* been done.

J. B. RHODES ON THE NEEDS FOR ORGANIZATION

ON the second day of June, at Columbus, Ohio, the permanent organization of the Ohio Independent Telephone Association was effected.

By the president of the Association a committee was appointed and this committee subdivided the State into nine districts, each district being in charge of a vice-president.

This district, No. 3, comprises the counties of Coshocton, Guernsey, Belmont, Monroe, Noble, Morgan, Meigs, Perry, Gallia, Athens, Washington and Muskingum.

For more thorough and effective organization and work, an auxiliary committee, composed of at least one representative from each county in this district, will be arranged, and by co-operation of these representatives, it is hoped that every Independent telephone company in the district will become a member of the Association, and work as a unit in advancing the welfare of all.

The purposes of this Association cannnot be better expressed than by the language of the Constitution, which reads as follows:

ARTICLE II.

The aim and purpose of this Association is to cement together in a firmer union all Independent non-Bell telephone interests in the State of Ohio, for the purpose of promoting uniformity of operation, maintenance and construction, to protect and defend all Independent Telephone Companies, members of this Association, by moral effort, co-operation and such other available means as may be deemed advisable to prevent the enactment of hostile legislation, promote the enactment and enforcement of laws that will encourage and stimulate development, and any and all other purposes that are deemed to the best interests of the members hereof.

In this connection I wish to say that we have an adversary with a very compact organization, with many millions of capital at its command, and with a desire to heartlessly crush us beyond redemption.

In the past each individual company has in its own way battled with this giant corporation, and the success of this campaign thus far is substantiated by the fact that at the present

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time in Ohio alone, we have more than 190,000 subscribers, while our adversary has less than 90,000, including the free list, which will quickly leave their ranks should they attempt to charge them for service.

With the many hundreds of hustling business men engaged in the Independent telephone business, their enormous resources and influences, complete success and mastery of the situation will be assured by concerted action of this tremendous power.

We have the full confidence of the public, and by just and fair treatment shall have no difficulty in retaining it.

The necessity for a strong and aggressive Association in Ohio has been particularly apparent during the past year.

While the attempt made by the Bell Company to have legislation enacted whereby all telephone companies would be obliged to connect their exchanges with Bell long distance lines, and the effort at having all Independent telephones removed from the postoffices of this country was frustrated through the efforts of individuals prominently identified with the larger companies—concerted action of all Independent interests in matters of this nature would be promptly available through an organization such as the Ohio Independent Telephone Association, which by its founders has been based upon a plan so broad and comprehensive that it is likely the same plan may be adopted by a National Association.

With such an organization, matters of vital importance to all Independent companies could be properly and promptly handled to the advantage of all. The long distance companies have taken the initial step in their efforts to standardize a system of accounting, and it is hoped that through the co-operation of the Association standardization of equipment as well as methods of handling business in all departments may eventually be worked out, and put into successful operation, thereby very materially reducing the volume of work which is now being done by each Independent company in its endeavor to make monthly settlements with neighboring companies.

The Bell Company has at last begun to realize the unpopularity of their course in the past, and to partially comprehend that the policy of the Independent companies is meeting with unexampled approval and support by the general public. They are therefore not only making an extraordinary effort to regain what they have lost in the cities, but are taking advantage of every available opportunity to demoralize the patronage enjoyed by the Independent companies in the rural districts by offering free county service and many other misleading propositions.

Whether or not they would fulfill such promises is not known in this county, for the reason that the contracts entered into with these people by the Independent companies are just and satisfactory, and they have yet to discover any proper excuse for engaging with the Bell Company upon any terms whatever.

So far as we have been able to ascertain, it is found that in the 3d district we have 47 Independent non-Bell Telephone companies. Blank forms for reporting were sent to each of these companies about the 15th of the present month. As yet, but 18 of these have responded with the necessary information. By computation we find that the number of subscribers served by these 18 companies is 7173, while the Bell Company in the same district has but 2775, slightly in excess of one-third the number of Independent subscribers. If this ratio is maintained throughout the district the total number of Independent telephones will exceed 18,000.

THE TELEPHONE PROBLEM IN LARGE CITIES

By P. Kerr Higgins.

MUCH lately has appeared regarding this problem, but the writers have almost exclusively confined themselves to manual practice.

In view of recent developments in Automatic Telephony, it is interesting to note that this affords the easiest solution to the much-debated problem. In practice it will be long before there will be demand for telephone systems supplying over 100,000 telephones; the Automatic system can handle this number. The present plan is to divide up the city under consideration into ten zones or centers, and in each establish an exchange of 10,000 telephones. Between these exchanges there would be trunks (proportioned as in manual practice). The work of the subscriber is no greater than for a smaller exchange. The first figure of the desired number (e. g., 98343) nine would select exchange No. 9 or numbers in the ninety thousands just as in smaller systems; the thousands are selected now.

In such a system the subscribers' wire mileage is reduced, and hence first cost of the plant is less. The time required to make a call and the mistakes likely to arise are no greater than in a smaller system. It would simply be a standard exchange with its units (switch-boards) scattered and its trunks lengthened. In such a large system some human assistance would be necessary to take care of the many traffic problems, but such is provided by special help, not operators.

The call is made in its simplest form, and no more contacts are necessary than in the systems now giving good satisfaction, and in view of the reduced cost of the plant rates may be reduced.

Another method would be to create a large main trunking exchange so that all trunking would be done automatically. In this way we could establish as many exchanges as we might desire, making them manual central energy and have the operator perform the automatic part. This would simplify the sub-station instruments, retain the intelligence of the operator, give a personal service, relieve the subscriber of the selection of his own numbers and confine the complicated portion of the apparatus to the central office, where it could and would receive the constant attention of experts. There is one drawback to such a system: many calls would have to pass through two operators.

The Automatic is not an experiment; it is a stern reality. There will be found uses for the Manual, but the general practice will be some form of automatic. That there is much room for improvement is true, but the same was also true regarding Central Energy practice, and the next five years will show a wonderful advance along full automatic lines.

USE OF THE TELEPHONE ON RAILROADS IN IOWA.

ONE of the economies practiced by the railroad managers of Iowa is the use of the telephone. The tendency has been to close up many of the small stations because of their unprofitableness, compelling the patrons to go to larger towns. Complaints have been made as to this change of policy, and the railroad commissioners have induced the railroad companies to make use of the telephone to a large extent in providing the facilities for the transaction of business. A telephone line is constructed to the station nearest the one that is without a telegraph operator, and a depot agent is secured who is not an operator. He conveys messages by telephone to the telegraph company and generally transacts all business in this way. The company saves the difference in salary between a telegraph operator and a depot man to handle freight. A great many of these telephone stations have been established in Iowa during the last year at a great saving to the railroad companies.

INDEPENDENT AND BELL IN INDIANA.

THE extent of Independent and Bell systems in Indiana is well illustrated by a comparison of the new directories of the Indianapolis Telephone Company and the Central Union Telephone Company. Number of New Independent long-distance offices in Indiana, 1,322; number of Central Union offices in Indiana, 411; number of offices reached by the New long-distance and not by the Central Union, 1,036; number of offices reached by the Central Union and not by the New long-distance, 125; number of offices common to both, 286.

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MEASURED SERVICE HINTS

By H. D. Stroud.

TO the exchange manager the telephone slot machine is a device to mechanically collect the prepayment of telephone charges. This is accomplished by requiring the user to deposit 5, 10 or 25 cents before receiving a desired connection.

The use of the slot machine for telephone service is in its infancy, and its possibilities as a vendor of telephone service are far-reaching. When these possibilities are more familiar to managers, there will, no doubt, be a rapid increase in the use of this method of selling telephone service.

There are a number of such fields for this coin, or, as it is sometimes called, "token" service. Token service is mentioned because where these machines are installed with a guaranteed use by a subscriber, tokens can be sold at any rate, at the discretion of the company.

Assuming that the company desires to offer this service, good plans are open.

Plan 1. Exchange auxiliary or double track service. The astute manager knows that there are many telephones that are busy almost continuously, and the complaints that these lines can never or rarely ever be had are numerous. It is difficult to improve this condition, because the only remedy is to put in more lines to such places, and it has always been a very delicate problem to show a subscriber that he has need for more lines, although he may be the very one who is continually reporting to the manager the fact that his customers complain that he is hard to get. Much tact is needed to convince a subscriber that he hasn't enough telephonic entrances to his office or store to let his customers in without compelling them to wait. A simple remedy is to request the subscriber to allow the company to run another line free of charge, the only consideration being the permission to put the flat rate telephone out of public view and reach and to install a coin instrument in as conspicuous a place as possible. What effect will this have and what compensation will the company get for the investment in the extra line? The best answer is, try it and see. It is evident that such a course would not only be significant of the company's progressiveness in the eyes of its subscribers, but will bar the deadhead from the flat-rate service, leaving these lines free for legitimate use. The coin telephone will not alone be used by the public, but in many cases for the subscriber's service at times when the regular line is busy and a call on the instant is important.

Until the traffic on these secondary lines becomes excessive they can be put on party wires, and as it is one-way service, no bells need be employed. To determine which stations on such a line are to be removed and placed on less busy lines the process is automatic, as the collections will show; for instance, if Smith is on a line with six others and his collector is found to have sixty coins when the other five average only twenty-five, it is plain that he is entitled to be on a less busy line because he is paying better interest on the investment. By removing Smith, room is made for three of the average size users.

Plan 2. Educational service.

The idea of educational service is not a novelty, though few of the Independent companies have given it much thought. It has, however, been a great success in some of the Bell exchanges. Think of the people of Chicago after having been told for years that there was none too much money in furnishing the best grade of telephone service for $175, being offered a telephone for 10 cents per day, the only difference being that in the latter case the company had the right to put ten telephones on the line.

This plan was largely responsible for an increase in the list of subscribers from 23,000 in 1900 to nearly 90,000 in 1904. Residence party-line service was offered for 5 cents per day, a notable reduction from the $60 per year rate charged before the era of the 5-cent slot telephone for residences. Yet these lines pay a neat profit. Nor is this a burden on the subscriber, for a large fraction of the receipts come from the people who before used the service without contributing to its support, but now are made to drop a nickel when they talk.

There is no doubt that if any fairly respectable residence district were canvassed and permission secured to put in a five-cent out-service telephone in every house there would be a big profit to the company at the end of the year.

The one-way or outgoing service telephone with a coin collector attached is probably the most satisfactory form of educational service.

The company hangs the box up on the wall with the permission of the householder, runs in the wire from the nearest junction with any party line, asking for no contract, but simply saying that if it doesn't pay we'll take it out.

This is the first step, the elementary lesson, teaching the people to use the telephone in their own homes. The next step will be a request for bells so that they can be called up. Then is the time to send your solicitor and land them for the best service you can get them to take while they show an interest.

The unprogressive manager remarks that you are taking long chances on an uncertainty, and what are you going to do if your subscriber on probation moves or decides he doesn't want a telephone? There is only one place to which he can move where you can't get him, and that is out of your territory, and his landlord has a direct interest in seeing that you get a new subject to work on.

If he decides after six months' use that he doesn't want a telephone enough to put in a nickel once in a while, you are only in the same condition that confronts any other business man who spends a little money in advertising.

This work could be done in such a way that the line expense would be light and the inside wiring can be shorter than in regular installations when the subscriber has the choice of locations. The instrument is always good for some other place, and need not be large, cumbersome nor unsightly.

Plan 3. Auxiliary residence service, commonly called "kitchen" service, is a field for the profitable employment of the one-way service. Its use is principally for the lady of the kitchen and is most often placed in her sanctum.

Tokens are the best for use in this service, and can be used conveniently, as these instruments are usually installed on a contract with a guarantee of from $3 to $6 per year. The tokens can be sold and payment received when delivered, or can be paid for when collected from the box. The former is doubtless the most satisfactory plan, as payment is secured for service to be rendered; is a plan considered good practice among railroad companies in handling mileage.

It is the writer's belief that the time is near when kitchen telephones on the coin and token plan will be popular, and that progressive grocery houses will have them put in for all customers who order regularly, the grocer agreeing to pay the difference between the actual amount of cash collected and the $3 or $6 per annum, according to the amount guaranteed.

There are many places where there is use for a good deal of telephone service, yet no one to be held responsible for rentals. The coin collector telephone should be used in such places as a measure of protection.

Boarding-house telephones are unprofitable on the flat-rate plan because the service is used by the whole house, while the same places, provided with controllers, would be very profitable to the company and less annoying to the subscriber.

Many thousands of gas meters are now being used that require the deposit of 25 cents before you can light your gas, then when the prepaid amount has been consumed you must put in another quarter. This plan was originally introduced as a measure of

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protection to the company to cover cases where people would move out and leave their gas bill unpaid. Is it not reasonable to believe that what is good for the gas man is likewise good for the telephone man?

City ordinances sometimes restrict the telephone companies in the amount they can charge for service. This will be found to refer in almost every case to the flat-rate plan.

There is no law in the land that can limit the number of nickels that a telephone company may take out of a machine that is installed without any contract. If there were, the same would hold good for all vending machines.

This opens a new field for the telephone company which started business with rates too low and now find that, with an increase of contracts, they have an increase of expenses out of all proportion at the present time.

The coin telephone can be offered at a lower guarantee than the present rates, and by making the would-be deadhead pay his way an increase in rates can be effected.

AN OPERATOR'S MERIT SYSTEM

By C. H. Judson.

IN 1902 the writer introduced into the operating department of the Twin City Telephone Company at Minneapolis and St. Paul a system looking toward the fixing of operators' wages according to merit, so that the diligent and deserving operator might reap the reward of her labor and the backward or indolent ones might be shown graphically wherein they were amiss in their duties. A sliding scale of wages was adopted in

A OPERATORS REPORT CARD
TWIN CITY TELEPHONE COMPANY
HALF MONTH ENDING _____ 190__
_____ OPERATOR
THE FIRST COLUMN SHOWS PERFECT NUMBERS THE SECOND COLUMN SHOWS NUMBERS SECURED ON TEST. 10% TAKEN OFF FOR EACH FAILURE.

1	Slow Answering	60	
2	Excessive Ringing	30	
3	Short Ringing	30	
4	Failure to report number to subscriber	60	
5	Failure to remain on line to hear connection	60	
6	Conversing with subscribers or operators	50	
7	Discussing Complaints with subscribers	80	
8	Talking too loudly	30	
9	Talking too far from transmitter	40	
10	Using the word "hello"	20	
11	Slow connecting with Chief Operator	20	
12	Failure to connect with Chief Operator	80	
13	Failure to repeat "Please refer to directory	20	
14	Using names instead of numbers	30	
15	Listening on lines	60	
16	Using the expression "Cannot get them	20	
17	Laughing in transmitter	50	
18	Failure to listen on order wire before calling	50	
19	Failure to remain on order wire to hear trunk operator	60	
20	Failure to repeat trunk number back to trunk Opr	40	
21	Failure to disconnect promptly	50	
22	Disconnecting too soon	60	
	Total	1000	

ADDITIONAL DEDUCTED FOR FAILURE IN DEPORTMENT, PUNCTUALITY, ETC. _____
NET MARKS FOR MONTH _____

which three grades of full-fledged "A" board operators appeared. The operators in one of these grades differed from those in another only in their standing as shown by their semi-monthly report cards. A copy of the card is shown above. The card is about 4 by 7 inches in size, and after being completed is shown to the operator whose record is engrossed thereon, and if desired a copy is given to her.

In making the test for record fifty calls are taken, preferably during some fairly busy hour, and of course the operators are totally ignorant of the time when they are being observed for the test. The test is made on an observation desk outside the operating room, and usually by some male employee of the traffic department who can be depended on to procure an accurate record.

A minimum number of points, say 950, is fixed for regular operators below which lies the ground of incompetency, and new operators must reach this point before being placed on the roll of regulars. The operator whose record lies between 950 and 960 receives the minimum regular operator's wages for the month following the test. Operators who record between 960 and 970 receive an additional five per cent. Those between 970 and 980, ten per cent.; those between 980 and 990, twenty per cent., and those whose record goes over 990 receive thirty per cent. above the minimum.

Thus it will be seen that if the minimum wage is $20 for full time "A" operators, those in the fourth grade will receive $21, third grade $23, second grade $25 and first grade $27. While these figures do not represent the wages paid by the company mentioned, they serve to illustrate the system.

As noted on the card, a deduction of ten per cent. is made for each failure. The card may seem rigid in its requirements, and yet in about one hundred operators in one of the cities several continuously kept their record above 995. In addition, points are deducted for unpunctuality, remissness in deportment, appearance or language in the rest room and other matters needing correction.

This system has the advantage of giving the operator an opportunity to classify her shortcomings, and thus bend her energies toward their elimination. The time required to make the tests is not great, and in the writer's opinion is well paid for by the improvement in the service.

"B" operators are tested on a special card and only once a month, as the number of items is smaller and they require less coaching than "A" girls, being usually graduated from among the best of that class.

Besides the graduated wage scale, prizes of $25, $15 and $10 were given to the operators holding the best three records for a period of six months. These prizes are eagerly striven for and are considered money well invested.

The writer claims no credit for originality in the use of the system, the idea having been suggested to him by various traffic men and managers in conversations bearing on the subject of efficient operation. It is an advance over the idea that simply because an operator has worked six months, and is punctual on duty and quick in answering calls, she is entitled to the maximum wage, an idea which seems to prevail to-day in many large exchanges, both Independent and Bell.

BELL SERVICE TO BE DISCONTINUED.

MERCHANTS in Owosso, Mich., have recently signed an agreement whereby they will discontinue the use of the Bell telephone on October 1, and retain the Union telephone only. So emphatic are they in their decision that it is further agreed that in case the Bell Company will not remove telephones they will themselves disconnect them and remove them from the wall. The Union telephone will be the only telephone in their place of business.

The Union Company's exchange is four times as large as the Bell Company's, and is giving a much better service. During the past summer the Union Company largely increased its exchange and added over 250 rural subscribers in the surrounding country as well as a large number in the city, so that now their exchange has over 900 subscribers. On the other hand, the Bell Company has less than 250 subscribers, and with such a small exchange the merchants can get along without the service of the Bell Company entirely.

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INDEPENDENT TELEPHONE SECURITIES AS AN INVESTMENT

By C. E. Wilson, *General Manager Keystone Telephone Company, Philadelphia, Pa.*

THERE is about $250,000,000.00 capital invested in Independent telephone properties in the United States, and the Independent companies are operating over 3,000 exchanges and serving about 1,600,000 subscribers. The majority of these are owned in the community where they are operating.

The value of Independent telephone securities is not as well established with bankers and the investing public, as it should be. There are several reasons: First, the banker is ever conservative. Second, the investor usually prefers securities with which he is more or less familiar. Third, the Bell interests, since they found they could not compete on commercial lines, have undertaken to fight the Independent companies by attacking their securities, and for the last five years, have resorted to every form of misrepresentation known to that coterie of 'frenzied financiers.' (With apologies to Lawson.)

Column after column has appeared in the leading daily papers as reading matter ('but placed at advertising rates') announcing the failure of this or that Independent company. A company in the far West would be written up in the Eastern papers or a company in the South in some Northern papers and investigation would invariably prove the stories to be false, but the parties most interested would never hear of it until it was too late to offset the effect by having a retraction printed.

A prominent banker stated to me, a few days ago, that an official of the Bell Company had placed the average cost of maintenance and operation of the various plants controlled by the American Telephone and Telegraph Company at 85% of the gross receipts. My answer was, 'If you have on your desk Poor's Manual, or the Manual of Statistics of 1903, and will look through the reports published, you will see that operating and maintenance are not reported as over 70%, and if you will note the number of subscribers in each case and add about $5.00 per subscriber to the net earnings, you will get nearer the true facts as an operating company has to pay about this amount to the American T. & T. Co. for royalties, which the Independent companies do not have to pay.'

Just as an illustration refer to the Central Union Telephone Company. Its report for 1901 indicated that it has 100,000 telephones; the gross receipts were $2,584,780; net receipts, $611,288.00; the estimated royalties, $500,000.00. On this basis, we estimated operating and maintenance at 56%. On the same basis, the Chicago Telephone Company report for 1902, 65%; The Cincinnati (Bell) Company, 54%; Cumberland Telephone Co., 50%; Hudson River Telephone Co., 54%; N. Y. & N. J. Telephone Company, 58%.

The banker and investor does not seem to understand that these royalties of something over $3.00 per telephone, according to American T. & T. Co.'s report, beside royalties on switchboards, come out of the profits, and are charged up by them as an item of maintenance and operation.

Another investor had had it pointed out to him that the telephone business was a bad investment as they were constantly needing new money and that the plant was never completed and it was necessary to make an additional investment from time to time. My reply was 'That is true, but you are heavily interested in electric lighting, gas, and trolley roads, and I have just been informed that you are making extensions to every one of those plants.' This is a condition that has to be met in every form of public service, and if the plant did not increase with the population, it would denote an unhealthy condition.

I am one who believes that the Independent interests will put the Bell out of business or that the Bell Company will put the Independents out of business. I believe the public demands competition. For years the Western Union Co. attempted to monopolize the telegraph business of the United States, but its patrons, to relieve themselves of the burden of over-charge and bad service, built Independent lines from place to place. Occasionally these lines were bought out with the result that another company sprang up immediately to take its place. This condition of affairs continued until the Postal Company was organized, and we have two great telegraph systems, extending all over the country; the service is very nearly perfect, the charges reasonable and both companies on a profitable basis.

Here in the East our average annual receipts per telephone are about the same as the average received by the Bell Companies. I know of few towns in Pennsylvania that have not both systems.

The fact is that in eight years' time the Independent telephone movement has made such strides that to-day it has more exchanges and more telephones than the Bell Company, which has been in business since 1878, and that approximately $250,000,000 has been invested in constructing 3,000 exchanges and installing approximately 1,600,000 telephones; and that the only point wherein the Bell Company excels is in its capitalization per instrument. I quote from "Telephone Development" by Vinton A. Sears of Boston:

Capitalization per sub. (Bell Co.).....	$417.00
Capitalization per sub. (Independent Co.)...	140.00

This should be convincing proof that this great industry is on a sound financial basis and is here to stay.

The policies of the Independent telephone companies are not dictated by hired officials nor their properties managed by employees who have no further interests than the drawing of salaries. The Independent companies are almost invariably owned right in the community where they are operated. They are financed and managed by business men of standing in the community.

I consider telephone securities just as good an investment and just as safe as trolley roads, gas, water, electric lighting, or any public utility. Some of us may be mistaken part of the time, but we can't all be mistaken all of the time, the Bell Company's statements to the contrary, notwithstanding.

Editor's Note.—Extract from an address made before Penna. State Ind. Tel. Assn. Convention.

NEW L. D. SYSTEM.

DR. ROBERT D. UNGER, of Chicago, claims to have invented a system which solves the problem of submarine telephony. By means of a series of induced currents produced by other induced currents he expects to transmit the voice over a longer distance than possible before. To accomplish this he has invented a cable within which are sectional conductors. These conductors are united by intervening compound induction coils of his own design. The undulating impulses are thus carried from the transmitting to the receiving end of a telephone line by a series of repeating coils.

FROM BOSTON.

THE man from Boston walked with mathematical regularity into the public pay station of one of our large hotels. To the operator in charge he remarked in dulcet tones: "I am desirous of interrogating if not actually maintaining an articulate conversation with a gentleman who possesses directly or indirectly the numerical designation of 2200 Main; will you kindly establish instantaneous telephonical communication with him?" It took ten minutes for the operator to recover.

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IMPORTANCE OF INDEPENDENT ORGANIZATION.

WE have been devoting considerable space lately to the movement that has set in for a closer organization among the Independent telephone companies of the United States. In this course we have been guided by the conviction that the most important question in the telephone field at this instant is this matter of perfect, business-like national association. For upward of two years, the editor of this paper has steadily pointed out the need of a change in the methods of the two organizations in the field, the National as well as the Interstate. In the course of this agitation it has been deemed necessary to say some rather unpleasant things, and to incur the displeasure of some of the people who have at times used these associations for their own ends. But while the parties immediately concerned may not have been entirely pleased with our utterances on this subject, the real telephone men, the active operators in the field, have, we know, been entirely of our way of thinking. Their feeling in the matter was voiced in an admirably clear fashion at the recent St. Louis convention in the letter read by Mr. Edward E. Clement, which had been addressed to him by Mr. O. C. Snider, the vice-president and general manager of the Kansas City Home Telephone Company. In this letter Mr. Snider said among other things:

> "I have read your letter with a great deal of interest, and fully coincide with you in your opinion as to the value of a representative National Independent Telephone Association. The associations which have existed in the past have not been successful. This condition has been due to the fact, as you suggest, that irresponsible people have controlled the associations. It is now time for the leading men who are interested in this enterprise to form a strong association, and work for the success of Independent Telephony.
>
> "The public must be taught that the securities of the better Independent telephone plants are good investments. At the present time only those who actually know the value of these securities can be interested.

On the whole, the National Association, as it has been handled in the past, has probably been at greater fault in this matter than the Interstate. At various times, the National has been dominated by a clique of men who were either utterly selfish or conspicuously incompetent. It has been used as a football to be kicked hither and thither. Its machinery, such as it was, has been employed at not infrequent intervals to forward the interests of this group or to thwart the desires of that. At the beginning of its existence, the National Association, weak as it was, undoubtedly accomplished a great deal of good. While in no sense ever representative, it nevertheless proved a valuable machine for the prosecution and defence of the patent suits that involved the very life of the Independent industry. For this service, the men who brought the association into life, should ever be gratefully remembered. But there came a time when its usefulness along these lines was practically at an end. And from that moment it seemed to stand as a bar to the new and important things that were demanded of a National Association that should bring real benefit to the Independent operators. It was out of this condition that the organization of the Interstate Association grew. Unfortunately this association also developed rather into a debating society than into a practical organization which should devote itself to the handling and settlement of those questions that make for the welfare of the industry. The Conventions of both associations have since proved practically barren of results.

WHY THE PRESENT MOVEMENT SHOULD BE SUPPORTED.

Unless all signs fail, the time has finally arrived when we are to see a change, when we may hope for cohesive, sensible, business-like action among the Independent operators. And it is needless to say that THE AMERICAN TELEPHONE JOURNAL will bend all its efforts towards aiding this movement to a successful issue. We firmly believe that the movement which started in Ohio and which has come to be known as the "Ohio Idea," will solve the problem. The Ohio operators, as detailed in our columns during the last two months, went at the work in a systematic manner, and they have effected an organization that already embraces something over 60 per cent. of the Ohio companies. The method of organization was thoroughly representative, and the results already effected are most promising. No better idea of the methods employed in Ohio can be given than is furnished in the address by J. B. Rhodes, delivered recently at Zanesville. Mr. Rhodes is one of the vice-presidents and head of the third district in the Ohio organization, and we deem his remarks of sufficient importance for reproduction in another section of this paper. It is our hope that every telephone operator will read this address, and also read the address of Mr. J. B. Hoge, the new president of the National Association, delivered at St. Louis on September 22d, and published in its entirety in our issue of September 24th. We believe that Mr. Hoge and his associates, elected at the St. Louis Convention, are going about the business of organizing the industry in a way that will at last bring into the field an effective association with which to meet the Bell campaign. It is our belief also that Mr. Hoge and the other officers of this association will be sufficiently broad-minded to solve the most troublesome problem that has heretofore balked the efforts at a comprehensive organization. This problem lies in the antagonisms engendered between the groups surrounding the Interstate and National Associations. While it is true that the Interstate in the past has accomplished no more in the way of practical workmanship than the National, it has at least had broader claim to representative membership. But with the spirit that manifested itself at St. Louis and which resulted in the election of Mr. Hoge to the presidency of the National Association, we think that this condition will pass away and that there lies today as great, or greater, potentiality in the National Association. Only one thing is now necessary to make this potentiality effective, and that is a combination of the two associations. There is no room in the field for two such organizations. Every sane man who is not blinded by his own desires or prejudices must admit that. It is absolutely essential for the existence of a compact working machine that one of the two associations now in the field shall go out of existence. We have assurances from the gentlemen who led in the movement at St. Louis, that every effort will be made to bring about this condition and that no personal considerations will be allowed to stand in the way of coalition. At the forthcoming convention of the Interstate at Chicago in December representatives of the National Association will be in attendance to present a plan which shall bring about this course. It is our hope that no selfish reasons will be allowed to stand in the way of success. If there are we shall hold the men who present these obstacles personally accountable, and all the power of this paper will be used for their elimination.

We are absolutely convinced that the time has come when an effective organization built on business lines can be created, and for our part we do not propose to see this opportunity wasted.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CITY'S POWER OVER TELEPHONE CHARGES.

Has the city council authority to provide what our charges for service shall be? The city attorney advises that it has under power to "license tax and regulate" telephone companies, and "to regulate and control the use of streets," and the council proposes to adopt a maximum rate for us.

J. B. C.

ALTHOUGH a municipality may be empowered to regulate and control the use of streets, yet this power will not confer upon it authority to regulate telephone charges. So it is held that the city of St. Louis, under the delegation of power to it by the legislature, has no power to fix or limit the rates of charges of telephone companies doing business within its limits. In this case the court said: "If the city had such power, it must be found in a reasonable and fair construction of its charter. We are at a loss to see what this power to regulate the use of streets has to do with the power to fix telephone charges. The power to regulate the charges for telephone service is neither included in nor incidental to the power to regulate the use of streets, and the ordinance cannot be upheld on any such ground." Though the city may have power to "license, tax and regulate" telephone companies, yet it cannot, under such power, regulate the charges for telephone service. City of St. Louis vs. Bell Telep. Co., 96 Mo. 623. 2 Amer. Elec. Cas. 44. State vs. Central Union Telep. Co., 14 Ohio C. C. 273. 7 Ohio Dec. 536. Joyce on Electric Law, section 525.

NOTICE OF TREE TRIMMING.

Before a telephone company trims trees to admit of the passage of its lines, need it give the abutting owner anopportunity to trim them? M.

No such notice is necessary. It was so held in Wyant v. Central Telephone Company, 123 Mich. 51.

ADDITIONAL SERVITUDE IN MICHIGAN.

Does the erection of a telephone line along the highway create an additional servitude upon abutting lands in Michigan? S.

It is not so held. See the above citation.

POLES MUST BE REMOVED.

ATTORNEY GENERAL CUNNEEN of New York has advised State Engineer and Surveyor Van Alstyne that the Hudson River Telephone Co. must remove its poles from their position on the Albany and Schenectady turnpike, where a good roads contract is in process of execution, if the poles interfere with the progress of work.

The attorney general in his opinion holds that the company must remove the poles, and if it fails to do so the highway commissioner may summarily remove them. He reaches that conclusion after a discussion of the legal rights of the parties involved, during which he says the purpose for which a highway is constructed and maintained is that it shall be used for the uninterrupted passage of men, animals and vehicles and afford access to the property of abutting owners, and it has been said that for the purpose of such passage the public have an easement in the whole of the highway where that is necessary; it follows that nothing can be permitted to be maintained within its limits which permanently obstructs public travel and the removal of such obstructions can be compelled.

"I do not mean to be understood that the telephone company has no right to maintain the necessary fixtures to carry its line along a public highway," says Mr. Cunneen, "but the rule established by the authorities is that the highway must be kept free for public travel, and if structures like telephone or telegraph lines are placed thereon they must be so constructed as not to prevent a free and uninterrupted use of the highway for travel by the public. The highway commissioners may, and should by written notice served upon the owners, direct the removal of the poles, and in the event of the failure of the owners to remove them the highway commissioners may, by their own motion, summarily remove them."

USE OF HIGHWAYS.

THE Northwestern and Tri-State Telephone companies are engaged in a war over the use of highways along which the Northwestern's Minnetonka lines run. The Tri-State has attempted to cross the Northwestern lines and the latter company alleges that, in making the crossings the former company has interefered with its wires and placed its own where Northwestern linemen cannot care for their own wires without great inconvenience. The company asserts that the Tri-State has injured the service it gives its lake patrons, and has entered the courts with an application for a permanent injunction to prevent its rival from putting up poles and stringing wires along the Northwestern Company's line from Minneapolis to Willmar, Minn.

END OF TELEPHONE FIGHT.

THE city council of Fremont, Neb., has granted the application of the Fremont Telephone company, the Independent concern, for a new license, and the difficulties between that company and the city, which have been in the courts for seven months, are apparently at an end. Last fall the company tried unsuccessfully to secure an advance of rates from the council, claiming that it could not exist at the franchise rates. The council refused to authorize the increase, and durnig the winter the rates were raised 50 cents a month in excess of the rates authorized by the franchise. Thereupon the council declared the license to use the streets forfeited, and gave the company ninety days in which to remove its poles and wires from the streets.

The company commenced a suit in the district court to restrain the city from proceeding to enforce the forfeiture. On the trial the city was successful. Since then there has been a change of management of the telephone company and more amicable relations established between the city and the company. The company has admitted that its course was ill-advised, and its application for a new license last night received the support of seven of the eight members of the council. The license gives an increase of rates, which, under existing conditions, will admit of the paying off of some of the debts of the company, but is not expected to yield a dividend for some time.

A QUESTION OF RATES.

We have two rates and two different grades of service. One of our subscribers pays the lower rate and insists on getting the special service. He claims that the rate he pays is all we are permitted to charge by statute, but we claim that the statutory rate applies to our ordinary service and not to the extra grade. We cannot afford to furnish the best grade of service at the maximum rate provided by statute. Please advise us as to the law upon this subject. J. Telephone Company.

A STATUTE prescribing the maximum rates to be charged for telephone service, in the absence of any classification of rates, will entitle the applicant for such service to receive the highest grade or class of telephone service, at the rate prescribed. The word "telephone," in a statute prescribing the maximum rental for the use of telephones, will be construed as referring not to a single instrument only, but to all the necessary and usual apparatus and instruments for the ready and convenient reception and transmission of telephonic messages. And such a statute cannot be evaded by supplying a limited service, at the rates designated, and a complete service at an excess rate, but the applicant should be supplied with all the usual exchange connections and facilities. Central Union Telep. Co. v. Beadbury, 106 Ind. 1, 5 N. E. Repr. 721, Am. Elec. Cas. 18. Joyce on Electric Law; section 523.

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IN THE OPERATING FIELD.

U. S. AND CUYAHOGA COMPANIES NOT TO BE SOLD.

SPEAKING about the report that the Cuyahoga and United States Telephone Companies were to be sold, President Dickson, in a recent interview, stated that neither of the companies would ever be sold except to strong Independent telephone men. Said Col. Dickson to a representative of *Finance:*

"The situation with regard to the United States is unusually strong, and I will tell you why. The strip of territory which stretches from the Great Lakes to Cincinnati and the Ohio River is the gateway between the great commercial centers of the East and the great commercial West.

"All of the freight destined for the West must pass through Ohio and all of the telegraphing and telephoning must pass through Ohio. This is the territory that is occupied, so far as the Independent telephone people are concerned, exclusively by the United States Telephone Company. It is the vital point in the whole situation, and we believe that we have the very best Independent long distance plant in the United States. We hold the key to the situation and we are not disposed to sell at anything less than a fair price.

"The property, as is well known, is not for sale, but every man will sell when he gets his price, and we will do the same provided the buyer represents strong Independent telephone interests. However, I do not believe there will be a sale of the United States or Cuyahoga Company, and I do believe they will be developed to their full capacity by the Everett-Moore syndicate and will eventually be two of the greatest earners in the telephone business, either Bell or Independent, in the United States."

KANSAS CITY BRINGS SUIT AGAINST THE M. & K. TELEPHONE CO.

PETITIONS have been drawn for suits by Kansas City, Mo., against the Missouri & Kansas Telephone Company, the Western Union Telegraph Company and the Kansas Electric Light Company and other electrical concerns that have not as yet paid the pole and wire tax authorized by the city ordinance. The city has refused to issue any more pole permits to the telephone company until payment is made, and it is stated that the company is starting to string its own wires without permits. As a result the matter has been referred to the legal department of the city.

HOLDS COURT BY TELEPHONE.

JUDGE LEWIS B. HIBBARD, of Highland Park, thinks he has found a new and convenient way of holding justice court in certain cases where the charge is not so serious and the accused is a reliable party. It has just been successfully tried there. A complaint was filed against a certain person. The justice sent him a note and the person called up by telephone. Thereupon the justice convened court, the accused pleaded guilty over the telephone and was assessed a nominal fine, which he promised to pay. Thereupon court adjourned.

MEXICAN TELEPHONE COMPANY MOVES ITS HEADQUARTERS.

RAPID progress is being made by the Mexican Telephone Company in preparing for the change of its offices from Santa Isabel, No. 6½, to Arcos de San Agustin, No. 8, in the City of Mexico. In order to make this change it has been necessary to place a large number of cables, some of which contain as many as 240 wires. All material necessary for the change has been received, including the switchboard of an improved type.

The new building, which the company is to occupy, is commodious and well suited for the purposes for which it is to be employed. The company will transfer there its shops for the manufacture and repair of its telephone apparatus, as well as its general offices. The room to be occupied by the switchboard is large and well lighted and arranged for the increase which may be expected in a considerable number of years. At present the company has about 1,800 telephones in use. Preparations are also to be made for two large retiring rooms for the operators, where accommodations will be provided for the taking of lunch, making coffee, etc.

The switchboard which is now being installed in the new office is what is known as the branch terminal, self-restoring drop switchboard, which has many advantages over that now in use.

EXTENSIONS TO SYSTEM AT BOWLING GREEN, KY.

C. A. EDWARDS, of Huntington, Ind., one of the promoters of the Home Telephone Company in Bowling Green, Kentucky, recently visited that city to look over the telephone plant. He visited Woodburn, going through the country where the Home Company is expecting to put in an exchange. While at Bowling Green he visited Smith's Grove and Morgantown and other places with a view to extending the system in those vicinities and looking after the interests of the company he represented. The line to Woodburn has already been started and will be completed at an early date. The Home Company is making every effort to put in as complete a telephone system in Warren County as is to be found in the country. It now has over 600 telephones in Bowling Green besides the connections that can be had with other places.

INDEPENDENT VS. MUNICIPAL IN BRANTFORD, ONT.

THE determination as to whether an Independent Telephone Company shall be allowed a franchise or that the municipal authorities shall install a competitive system at Brantford, Ont., is still unsettled. From the investigation made by the city of Ottawa it would appear that it would be preferable to grant a franchise to an Independent company. The reason can best be explained by a statement of facts. It would necessitate an expenditure of from $35,000 to $40,000. This would mean either negotiating a loan or else investing just so much of the city's funds which could be used to other purposes.

The general trend of public opinion seems to be toward the granting of an Independent franchise, since if it is decided at any future time to secure the property, this could be done much easier than by constructing a system at the present time.

A NEW SYSTEM.

GREGORIO PANSA, an Italian engineer, is the inventor of an apparatus which fulfils the three-fold functions of wireless telegraph, wireless telephone and wireless autographic postal service. He has been experimenting with his invention for two years at Cassino, near Rome, and is at present in negotiation with both the French and United States governments and with an English telegraph company with a view to selling it.

Pansa says that his apparatus secures absolute secrecy for wireless telegraph messages which cannot be tapped en route. The most astonishing feature of the new system, however, is its postal

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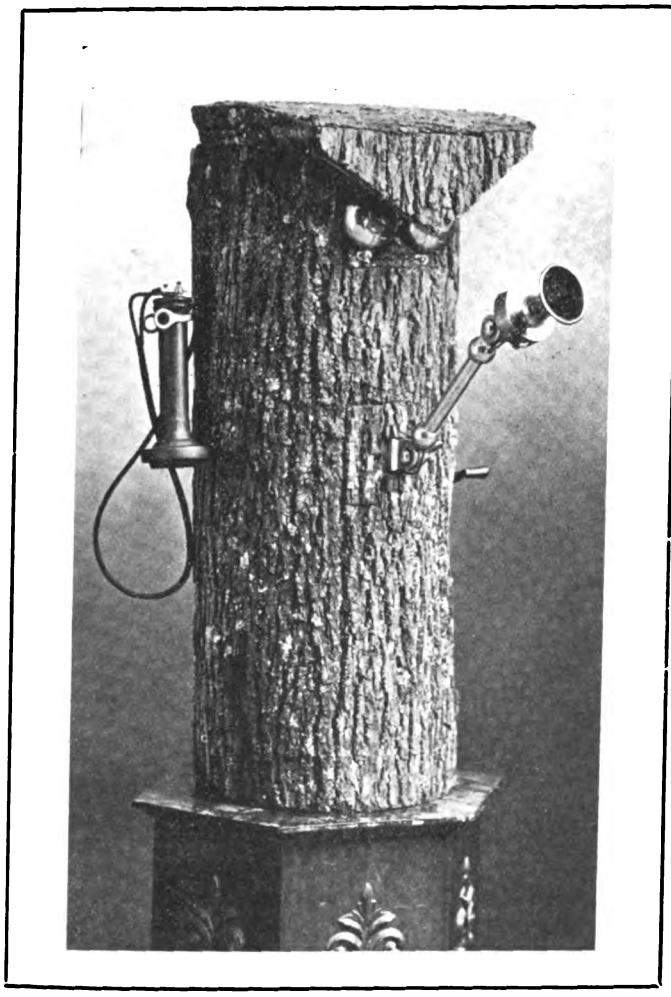
service. All that is necessary is to write with special ink on chemically prepared paper and drop the letter into an aperture in the machine and the apparatus does the rest. A fac-simile autograph copy of a letter from New York can be delivered in London in the time it takes to send an ordinary cablegram. Pansa says that telephoning between New York and London presents no difficulties with the new system.

PATIENCE AND PERSEVERANCE.

SOME people are endowed with a much larger amount of patience and perseverance than others. Mr. E. A. Peters, superintendent of the Buchanan County, Iowa, Telephone System is an illustration at point. He conceived the idea of constructing a telephone in the most unique manner. During his spare time a section of a tree was hollowed out and in and upon it were mounted the various pieces of apparatus which go to make



a telephone. The result of his ingeniousness is shown in the accompanying illustration which gives evidence of a large amount of initiative in design and mechanical arrangement.

Mr. Peters has been engaged in the telephone business for the past six years, two of which were spent in a factory and the remainder in exchange work and operation in the Independent field of northeastern Iowa. The faculty of taking pains and working diligently has placed him in a position in which all who have met him are of the opinion that he is a thorough telephone manager.

TELEPHONE CONNECTIONS ON TRAINS.

THE St. Louis, St. Charles & Western Railroad will be the first western road to adopt the use of telephones for the convenience of its passengers on trains. An agreement has been entered into with the American Car Telephone Company by which the line of the road will be equipped with a telephone system by means of which passengers on the trains, while traveling, will be in direct communication with St. Louis. The device follows somewhat the plan of an overhead trolley.

The Pennsylvania Company is now running through Ohio, for the special benefit of Pittsburg wholesalers, a passenger train which has a most unusual equipment. There is a telephone in every seat, and as soon as the train arrives at a considerable city, where a stop of some time is to be made, connection with long-distance telephone lines is made, so that the occupants may talk with their home houses.

NEW TOLL LINES IN NEBRASKA.

THE Western Telephone Company, recently incorporated at Lincoln, Neb., announce that they will build at once toll lines in all directions from Lincoln. They have already completed their line to Palmyra to connect with the Nebraska City lines, and are now at work on lines south to Beatrice and west to Crete and Kearney. They also intend building north to Columbus. They are offering a very liberal contract to exchange managers.

SUCCESS OF MINNESOTA COMPANY.

THE Citizens' Telephone Company of Mankato, Minn., is meeting with very good success, and during the six years of its life has built over 25 miles of toll lines and a like distance of rural lines. The company has also opened up connection with a number of farmer lines throughout the State. The present developments of the company include connections at Worthington with the Sioux Falls line now being erected at Yanktown, Mitchell and Sioux City.

CALHOUN COUNTY TELEPHONE CO. OPENS UP NEW TERRITORY.

THE Calhoun County Telephone Company has opened up a new territory recently that it has never reached before in southern Michigan and northern Indiana in addition to the regular toll points. This means an addition of between two and three thousand new subscribers. The new points reached in Michigan are Fairfax, Nottawa, White Pigeon, Constantine, Coldwater, Quincy, Batavia, Bethel, Matteson, Girard; and in Indiana, Orland, Angola, La Grange, Rome City, Kendallville, Goshen, Elkhart, South Bend, Mishawaka, Fort Wayne, Albion, Lafayette, Butler.

These additions will be in the new directory which is now in the printer's hands and will be ready for distribution about the first of November.

OHIO TOLL LINE COMPANY INCREASES DIVIDEND.

AT the semi-annual meeting of the Northwestern Ohio Telephone Toll Line Company a dividend of five per cent. was declared, an increase of one per cent. over the dividend formerly paid. The company is doing an excellent business. There is very little of the stock on the market and it is held around 40. The company has outstanding $40,000 bonds, and besides paying a dividend of four per cent. on the stock, retired a $1,000 bond last year. This is a Barber & Brailey enterprise, with James E. Brailey president and Charles Peckham secretary.

TELEPHONE SYSTEM IN A PENITENTIARY.

A COMPLETE telephone system connecting every department of the penitentiary with every other part, and putting every guard in the institution within instant communication with the office of the warden and with every other guard on duty, is an innovation in the penitentiary at Salt Lake City, Utah.

The telephone system is simple. There is a call box in every ward and in every watch tower, so that in case anything goes wrong in any department of the prison at any time, day or night, it is but the work of a moment for the guard to communicate directly with the main office, or call for help from any other department of the prison, and all this can be done quietly without turning in a general alarm.

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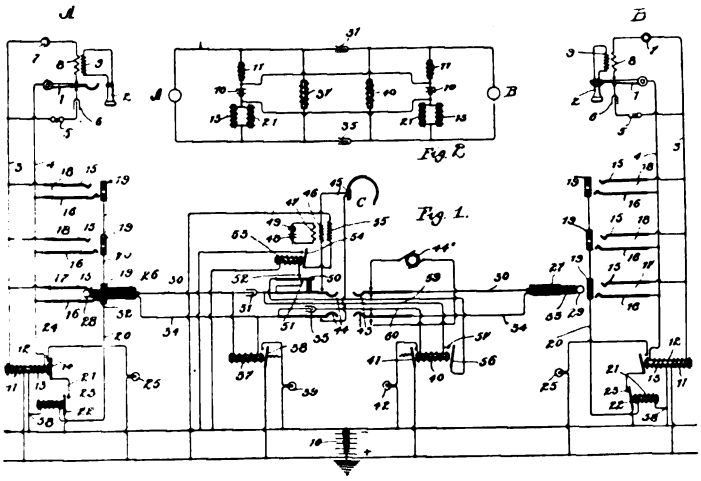
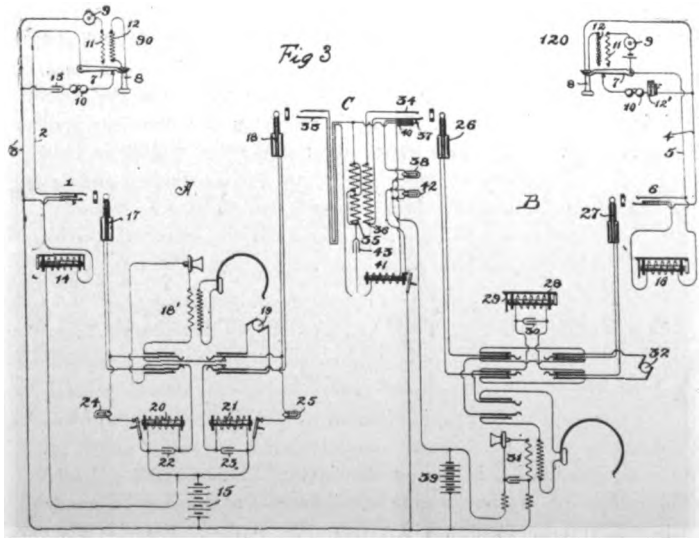
TELEPHONE PATENTS

TELEPHONE EXCHANGE SYSTEM.

W. M. Davis, of Chicago, Ill., patents (Nos. 770,268 and 770,269) and assigns to the Stromberg-Carlson Telephone Manufacturing Company two common battery exchange systems. Patent No. 770,269 relates to a general system for operating common battery exchanges. The essential features are shown in the accompanying illustrations, Figs. 1 and 2. The operation of this circuit is as follows in which *A* and *B* are subscribers'



sub-stations and *C* is the central office. When the hook switch is raised there is a circuit from the positive pole of the battery *10* through the winding *11* of the line relay *12*, to the substation, then to winding *13* of line relay *12* and back to the negative pole of the battery. The relay is thus excited and closes contact *14* of illuminating signal lamp *25*, the circuit of which passes through the contact *23* of the cut-off relay *21*. When the plug *26* is inserted in the jack *17*, it closes the circuit of the cut-off relay *21* in parallel with a circuit through winding *13* of the line relay *12*. The cut-off relay is then excited, its armature attracted, contact *23* opened and the lamp *25* extinguished. The supervisory signal *37* is controlled by a circuit extending from the positive pole battery *10* through winding *11* of relay *12*, thence to spring *17* of the jack, thence



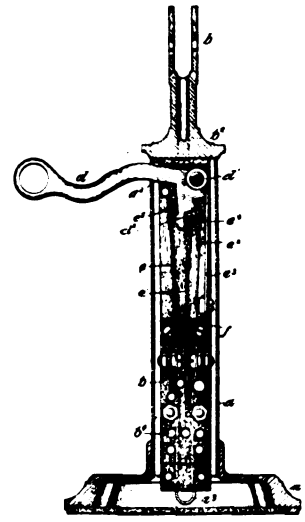
to conductor *30* through the relay *37* to conductor *34*, thence to conductor *20* to cut-off relay *58* to the battery. The test is provided by means of a special test relay *53*.

This patent is a voluminous one, containing 64 claims that specify many interesting features, so that the reader who is interested in telephone circuits would do well to procure an original copy.

In Patent No. 770,268 Mr. Davis discloses a system particularly adapted for operating in connection with toll boards. The circuit is shown in Fig. 3, in which 90 represents a common battery subscriber. The chief features in this circuit are the double supervisory lamps *38* and *42*, which are controlled by the relay *41* in such a manner as to give the operator complete knowledge of the wishes of the subscriber. The circuit is so easily traced from the drawing that further explanation is unnecessary.

DESK SET.

C. L. Boyce, of Detroit, Mich., patents (No. 770,157) and assigns to the Western Electric Company, of Chicago, a desk set. The object of this invention is to provide an improved desk set which is accomplished as is shown in the accompanying illustra-



tion. The inventor provides a stem hand *a'* carrying a vertical cap *a*, into which the mechanism of the hookswitch is inserted. This consists of an insulating strip *b*, upon which the mechanism is mounted, and is provided with an insulating block *f*, which carries the various contact springs *e*, *e'*, *e2*, *e3*, *e4*.

SELECTIVE SIGNALING DEVICE.

J. A. Brown, of Blythewood, South Carolina, patents (No. 770,556) an improved selective signaling device. The object of this invention is to provide a mechanism for selective signaling to be used upon series lines adapted for party lines in small towns and villages. The apparatus is intended to be selective and secret. It employs the familiar step by step mechanism, which is actuated by an electromagnet that is under the control of each station. The apparatus is exceedingly complicated, requiring three sheets of drawings for illustration, and we suggest to those interested in this department of telephony to procure a copy of the original patent.

TELEPHONE REGISTER.

G. A. Long, of Hartford, Conn., patents (No. 770,377) a telephone toll register and assigns to Gray Telephone Pay Station Company, of Hartford, Conn. The object of this invention is to provide a register for the measured service telephone. It consists of a kind of cyclometer mechanism, which is operated by a push button. As soon as the operator notifies the calling subscriber that the desired party has been obtained, the subscriber presses the button. This actuates the cyclometer and registers the number and at the same time causes a buzzer to sound and notifies the operator that a call has been registered.

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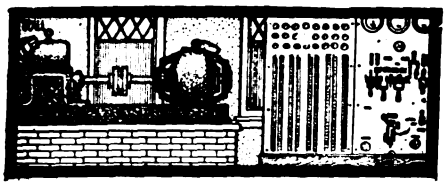
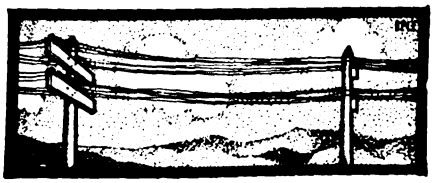


QUERIES

Questions on any subject relating to telephony will be answered on this page.



EXTENSION INSTRUMENT.—(440.)

I have a call to place an extension instrument on a line under the following conditions: It must be so arranged that central can call the main instrument, the main and extension instruments together, or else signal an extension bell. The main and extension instruments are in the house and office, the extension bell is in a mill. Will you please suggest a circuit? There is a return call bell between the office and mill now. Could this be used? G. L.

A circuit which meets the requirements you desire is illustrated in Fig. 440. The switch should be placed near the main instrument, *B*. Its operation is as follows: In the normal position the circuit to the main instrument is closed while the extension instrument and bell are open. Moving the key in the direction of *N* will cause the extension instrument to be bridged across the line, whereas if it is moved toward *S* the main line will be thrown in circuit with the extension bell and the main and extension telephones cut out. The return call bell circuit could be used to signal between the main and extension instruments when it is required to talk between these two points without signaling the exchange.

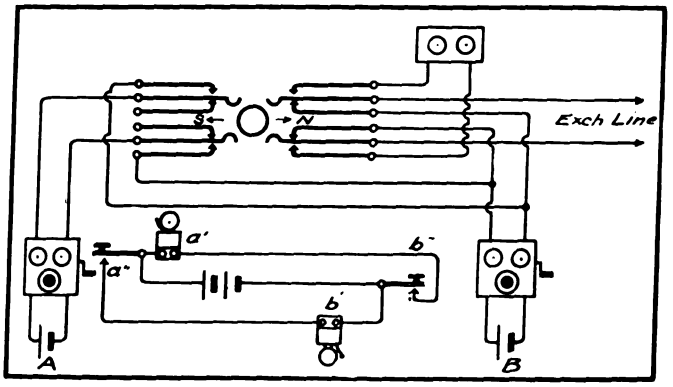


Fig. 440.

COMMON RETURN.—(441.)

We have a common return system, the return wire being No. 12 copper. Can I put too many telephones on the one return or is it better to have them all on one? We have leads running in four directions, all coming into the cable pole separate. So I connected the four together making one return of them all. Was this right or would it have been better to run another No. 12 with the old one, making the return larger? E. L. C.

Replying to your question in regard to the arrangement of telephones upon a common return wire, a No. 12 wire is too small to be advantageously used in any common return. A No. 8, or preferably, a No. 6 is as small as should be employed. It does not make a great deal of difference, under ordinary circumstances, as to how many telephones are placed upon the common return. Usually, the return system is planned to extend in such a manner throughout the town as to reach all subscribers conveniently and then instruments are connected up indiscriminately.

NOISY LINE.—(442.)

Is it necessary to transpose a telephone line more often than four times in a mile? We have a line that runs near an electric lighting circuit and at night times it becomes very noisy. We transposed it four times to the mile but did not seem to get any better results. What is the trouble? S. T.

In all probability your line is grounded or else unbalanced to a great extent. We would suggest your making a thorough test of the circuits for both these troubles. If the line runs very close to the high potential circuit it will be almost impossible to get rid of all the noise without using twisted pair conductors. Telephone lines should not be less than six feet away from a power circuit, nor should they be run on the same pole line. There is always more or less leakage which it is almost impossible to stop, and this would add greatly to your trouble.

INTERCOMMUNICATING SYSTEM.—(443.)

How do I connect three magneto instruments for an intercommunicating system? I want the simplest diagram of connections. L. R.

Fig. 443 illustrates a very simple method of connecting any number of instruments for intercommunicating operations. The wiring is as follows: Run as many wires as there are telephones to be connected and add one wire, which acts as a common return. This common return must be tapped on to each instrument. Run the instrument wires to their respective points upon a circular switch and connect the other line binding posts of the instruments to the switch levers.

In this system it is evident that the switches of the instruments must be kept upon their home points when not in use, else the right party cannot be called as his line is open, and also should one party have his switch on the line of another he would be called when the other party is called. There are several ways to overcome this difficulty which are more or less complicated. In connecting up switches of this type the home point is generally placed to the extreme left, so that it is a simple matter to tell whether the switch is on its home point or not. If you desire further information upon this point we will be pleased to furnish it.

To operate the system move the lever to the line of the party desired and ring in the usual manner. Thus, if No. 1 wished to call No. 3, he would place his lever on No. 3 point of the switch, completing a circuit between the two instruments by means of the common return and the line of No. 3 instrument.

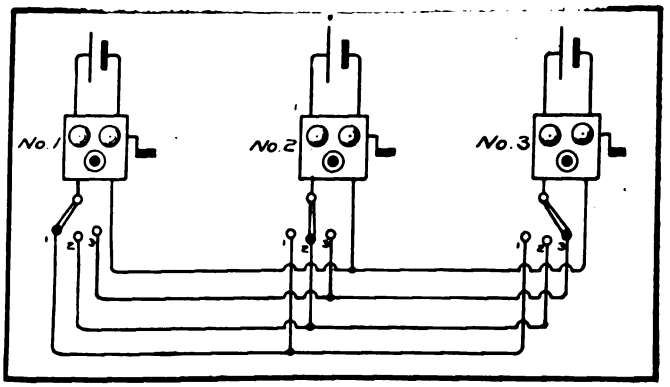


Fig. 443.

AN INNOVATION IN CABLE LAYING.

AN innovation in pulling in cables, it is reported, will be tried by the Sioux City Telephone Company.

Instead of using rods to get the rope through the conduits that is used to pull in the cables, rats will be let loose in the conduits and ferrets sent in after them with cords attached. All the way through the conduit the ferret smells the rat and the rat, if he looks backward, can see the glaring eyes of his arch enemy, which will spur him on to the end of the tube. In this way the line will be drawn through and afterwards a heavy rope attached to it to pull in the cable.

NEW PLANT FOR BELLAIRE, OHIO.

THE Ohio Valley Telephone Company of Bellaire, Ohio, will install a telephone plant of the most approved type. It has purchased the requisite property and asked for bids for a fire-proof building with all modern improvements. The construction work will be the open wireless or all cable construction, using the multiple tap system of distribution. In the business districts underground conduits will be installed. The engineer for the system is Frank B. Hall, who was the engineer for the Utah Independent Telephone Company in Utah.

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THE WEEK'S MESSAGES

FINANCIAL.

FARMINGTON, CONN.—The Farmington Telephone Company has declared a semi-annual dividend of 3 per cent.

CHICAGO, ILL.—The directors of the Automatic Electric Company of Chicago declared the regular dividend of 2 per cent. payable November 1st.

HOPEDALE, ILL.—The Farmers Telephone Company has increased its capital stock from $5,000 to $20,000.

VALPARAISO, IND.—The Northwestern Telephone Company of Valparaiso has increased its capital stock from $15,000 to $50,000.

CENTERBURY, OHIO.—The Central Ohio Telephone Company has increased its capital stock from $10,000 to $50,000.

PHILADELPHIA, PA.—It is stated that the Keystone Telephone Company has extended its $1,400,000 loan on the original basis. The company's net earnings for the last nine months ending September of this year, are reported at $257,124, as compared with $158,425 for the corresponding period of last year.

FRANCHISES.

MARYSVILLE, CAL.—Messrs. Dalby & Anderson have approached the city council for a franchise.

REDONDO, CAL.—By a unanimous vote the city council passed an ordinance granting a 50-year franchise to the Home Telephone Company.

ALEXIS, ILL.—The city council has granted a franchise to the Alexis Telephone exchange, which will at once commence the installation of a local system.

COVINGTON, KY.—The Business Men's Club has issued a petition to the councils of various villages in Mill Creek Valley, asking that the Queen City Telephone Company be granted a franchise.

EASTBROOK, ME.—The Eastbrook Telephone Company has asked for a permit to construct lines through certain parts of the town of West Franklin.

ALBION, MICH.—The city council, at a recent meeting, granted a franchise to Charles W. Taylor of Detroit for the construction and operation of an Independent telephone system in this place.

RED WING, MINN.—The council has granted a telephone franchise to T. M. Neill of Red Wing, representing the Moulton interests.

CRETE, NEB.—The Crete Home Telephone Company has applied for a franchise to construct and operate an Independent telephone system.

PERTH AMBOY, N. J.—The city council reconsidered the ordinance granting the Hudson and Middlesex Telephone and Telegraph Company a franchise, which was defeated and passed out by a vote of 4 to 2. W. J. Lansley is general manager of the company, with headquarters at 164 Market street, Newark, and Malcolm McLear is president.

CINCINNATI, OHIO.—At a meeting of the Mutual Creek Valley Business Men's Club, held in Elmwood place, a resolution was passed to petition the councils of the various villages in the valley to grant franchises to the Queen City Telephone Company of Cincinnati.

COLUMBUS, O.—The Jackson County Home Telephone Company has filed an amendment to its charter so that it may extend its lines through Jackson, Pike, Ross, Gallia, Vinton, Lawrence and Scioto counties. Work on the new lines will be begun soon.

SALEM, ORE.—Application for a franchise has been made by W. D. De Varney. Mr. De Varney left for Portland, where he will also ask for a franchise.

DODGEVILLE, WIS.—Thomas Convey, president, William Kramer, secretary, and James Laughlin and P. H. Miess of the Ridgeway Farmers Telephone Company were here recently and appeared before the city council asking for a franchise to construct a line through the State and install a local system.

ELECTIONS.

POMONA, CAL.—At the annual meeting of the stockholders of the local Home Telephone Company the following officers were elected: John Law, president; F. W. Thomas, vice-president; Arthur M. Dole, secretary; C. F. Walker, treasurer, and D. S. Parker, manager.

ARCOLA, ILL.—The stockholders of the Arcola Grain, Coal and Telephone Company at their annual meeting re-elected H. O. Snyder and J. Coonde as directors for a term of three years.

NEW LONDON, IA.—The stockholders of the Henry County Telephone Company have elected the following officers: J. L. Portlock, Green Lee, T. T. Laughlin, W. J. Francy, Frank Smith, J. E. Peterson and James T. Whiting.

WILLIAMSBURG, MASS.—At a meeting of the Williamsburg Telephone Company the following officers were elected: A. S. Hills, president; E. W. Goodhue, vice-president; Stephen Jorgensen, secretary and treasurer. Work on the construction of the plant will be started at once.

CUMBERLAND, MD.—At the annual meeting of the Western Maryland Telephone Company the entire board of directors and officers were re-elected.

HEATH, MASS.—At the annual meeting of the Heath Telephone Company the following officers were elected: W. E. Kinsman, president; H. Newell, clerk and treasurer.

ANNATON, WIS.—The Annaton-Preston Telephone Company has elected the following officers: J. R. Monteith, president; August Lenz, vice-president; William H. Finnegan, secretary and treasurer. It was voted to increase the capital stock by $6,000.

COMBINATIONS.

CLAYTON, ILL.—The Siloam Telephone Company has been sold to B. F. Clark of Perry Springs.

DICKSON, ILL.—The Lee County Telephone Company has sold its exchange and property in Ashton, Franklin Grove, Amboy, Lee Center, Walton and sublet the Farmers Telephone Line.

INDEPENDENCE, MO.—J. S. Hale, principal stockholder of the Home Telephone Company in this city, has sold his Warrensburg and Knobnoster exchanges to the Kinloch Telephone Company of St. Louis.

PULASKI, N. Y.—It is understood that the Ontario Telephone Company of Oswego, N. Y., is negotiating for the purchase of the Black River Telephone's system in Pulaski.

PHILADELPHIA, PA.—The Cumberland Telephone Company and the Winchester Telephone Company, which are operated by the United Telephone and Telegraph Company of this place, have been consolidated.

WAITSBURG, WASH.—A meeting has been called of prominent business men in this vicinity to provide for the extension and improvement of the rural telephone system which has a center in this city. It is probable that various lines will be combined under one management.

NEW COMPANY NOTES.

COLORADO CITY, COL.—An Independent telephone company has been organized here with M. H. Stere of Lincoln, Neb., as general manager. N. B. Hames of Colorado City is president of the company, which claims to have a franchise obtained at a special meeting of the city council of Colorado City.

FINDLAY, ILL.—The East Mutual Telephone Company has been incorporated with a capital stock of $600, by James E. Francisco, Archibald M. Lesley and Curtis Spicer.

CHANDLER, IND.—The Chandler Telephone Company has filed articles of incorporation with the secretary of state with a capital stock of $2,500. The company will build an exchange in Chandler, construct and operate telephone lines throughout Warrick County. J. W. Webb, William M. Gardiner and W. M. Cosler are the incorporators.

GRANTSBURG, IND.—The Temple Telephone Company has been organized here with a capital stock of $5,000. The company proposes to establish a principal exchange in Grantsburg and telephone lines throughout Crawford, Harrison, Perry, Orange and Washington counties. Joseph A. Blevins is president and Samuel H. Miller, secretary of the company.

INDIANAPOLIS, IND.—Articles of incorporation have been filed with the secretary of state by the Western Grove Telephone Company of Hancock County with a capital stock of $320. The directors are: W. F. Thomas, J. C. Hamilton, J. Binford, Sylvester Jessup and E. W. Pusey.

BARNUM, IA.—The Barnum Telephone Company has filed articles of incorporation with a capital stock of $10,000.

CHARITON, IA.—The Richard E. Pedigo Company of Chariton has been incorporated with a capital stock of $10,000, for the purpose of selling territory, granting rights and privileges to sell a certain patented device and improvements thereon known as the Pedigo lightning arrester and telephone cut-out. The officers are J. A. Pennick, president; Richard E. Pedigo, secretary, and W. E. Ashby, treasurer.

MADRID, IA.—J. P. A. Anderson, president of the Madrid Telephone Company has invented a lightning arrester and a company will be organized to manufacture them.

ELDORA, IA.—The Eldora, Rough Woods and Point Pleasant Telephone Company of Eldora has been incorporated with a capital stock of $10,000. The officers are: E. H. Sheldon, president; B. J. Lyman, vice-president; M. D. Kennedy, secretary; F. E. Sprain, treasurer; R. J. Heath, W. H. Wehrman and F. E. Sprain, directors.

WASHINGTON, KAN.—The Washington Telephone Company has been incorporated with a capital stock of $2,500.

WHITE PLAINS, KY.—The White Plains Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are: W. N. Bayly, L. H. Johnson and R. P. Teague.

MANCHESTER, ME.—The Woodland Telephone Company has been organized here to maintain telephone lines in the towns of Manchester, West Gardiner, Litchfield, Farmingdale and the cities of Augusta, Hallowell and Gardiner. $10,000 capital stock. F. S. Collins, president; James T. Collins, treasurer.

GAYLORD, MICH.—About 35 farmers southwest of Gaylord have for some time been talking of a telephone line to Gaylord, and things have so far progressed that it is now in sight. It will connect with a line already built seven miles out from Alba, and from there will extend into Gaylord.

NEWTON, MICH.—The Newton and Leroy Telephone Company, with headquarters at the Newton Center school house, Calhoun county, has been organized. The company will build and maintain a farmer telephone line in Newton and Leroy townships. The stockholders are: E. C. Corey, Union City; J. A. Hurd, Ceresco; Henry Randt, Ceresco; H. W. Flanders, Ceresco; G. D. Spooner, Ceresco.

LIBERTY, MO.—The Missouri Independent Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are: Logan Woodson, Pascal Parker, Samuel H. Woodson.

NEOSHO, MO.—The Granby and Neosho Telephone Company has been incorporated with a capital stock of $3,000 by Edward Haas, R. E. Willard, J. H. Hughes and others.

PLEASANT GREEN, MO.—The Pleasant Green Telephone Company has been organized here. The officers are as follows: Georg Eppright, president; F. Cleland, secretary; William Riddle, treasurer, and J. W. Wall, manager.

HASTINGS, NEB.—The Hastings Independent Telephone Company has filed articles of incorporation with the secretary of state with a capital stock of $30,000, by H. H. Hendon, N. E. Batty, J. N. Lyman, G. F. Keefer and G. H. Platt.

ANDOVER, N. Y.—The Pony Telephone Company has been organized with the following officers: Orange Smith, president; J. W. Jenkins, vice-president; W. W. Pingrey, secretary, and Elmer Kaple, treasurer.

NEW YORK CITY, N. Y.—The Edmonston Telephone Company of New York has been incorporated with a capital stock of $100,000 to manufacture telephone apparatus, by the following directors: Burton Thompson, Daniel M. Miers and John E. Ruston.

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PATCHIN, N. Y.—The Boston Valley Telephone Company has been incorporated with a capital stock of $2,000 by L. G. R. Whiting, John W. Gasper of Patchin and F. A. Wurtz of Boston, N. Y.

BOTKINS, OHIO.—The Botkins Telephone Company has been organized with a capital stock of $20,000, by S. H. Mendenhall, Charles Eisley, Joseph Miller and others.

RINGWOOD, OKLA.—The Star Telephone Co. has been chartered to build, operate and maintain rural and toll telephone lines in Oklahoma. The incorporators are: W. L. and M. J. Miller and J. H. Huffman, all of Meno.

WINDSOR, ONT.—The Ontario Independent Telephone Co. has been incorporated with a capital of $100,000; head office, Windsor. Directors: C. W. Taylor, J. R. Brooks, J. A. McRae, P. T. Chesley, and A. D. Prosser, all of Detroit.

NEW WILMINGTON, PA.—A telephone company has been organized here and will build a trunk line to New Castle. A company has also been organized at Plain Grove to install a toll line to New Castle by way of Eastbrook.

PERRYSVILLE, PA.—The Perrysville Telephone Company has been organized for the purpose of operating a telephone line between Genesee, New York and West Bingham, Pa.

GRANITEVILLE, S. C.—The Graniteville Telephone Co., capital $3,500, has been chartered to construct telephone lines from this place to Vaucluse, Bath and Clearwater. W. A. Giles, T. H. Rennie and G. L. Knight are the incorporators.

PERSONAL.

FRANK B. HALL, who has been acting as chief engineer for the Utah Independent Telephone Company, has taken charge of the engineering department of the Ohio Valley Telephone Company at Bellaire, Ohio. This will be the twelfth plant having open wireless or all cable construction installed by Mr. Hall.

J. W. LATTIG and C. L. GOODRUM, (formerly superintendent and chief engineer respectively) of the United Telephone and Telegraph Company, have accepted positions with the Stromberg-Carlson Telephone Company.

OLIVER L. TURGEON, manager of the Southern New England Telephone Company in Meriden, has resigned his position.

A. J. BEVERLIN has been appointed manager for the Central Union Telephone Co. at Rock Island to succeed H. H. Unverforth, who goes to the company's headquarters at Indianapolis.

P. J. CUNNINGHAM has been appointed to position of division inspector for the New England Telephone Co. at Lowell, Mass.

JAMES A. WILLIAMSON has been appointed manager of the Mayfield office of the Cumberland Telephone and Telegraph Co.

MISCELLANEOUS.

CHILLICOTHE, OHIO.—The People's Telephone Company's exchange and system have been totally destroyed by fire.

MONTICELLO, IND.—During the recent severe electrical storm the Monticello telephone exchange was burned out.

ONANCOCK, MD.—The Diamond State Telephone exchange, in this city, was damaged by fire to the extent of $500.

HAYDENVILLE, MASS.—An Independent telephone company is being projected here.

KANSAS CITY, MO.—C. E. March, manager of the Independent Telephone Co., of Saginaw, Mich., has been paying this city a visit during the past week.

CAMDEN, N. J.—The Eastern Telephone & Telegraph Company's lines were destroyed by fire recently.

HOMER, OHIO.—The loss to the Independent Telephone Company caused by fire will amount to about $500. The whole telephone service burned out, and will practically have to be rebuilt.

ASHLAND CITY, TENN.—The Clarksville (Tenn.) Home Telephone Co., H. M. Perry, manager, will probably establish an exchange here.

LA CROSSE, WIS.—The Bangor Telephone Company's exchange was destroyed by fire within one hour after being moved into a new location. The fire started from a gasoline lamp which the linemen had been using in their work and which they had left burning when they went outside.

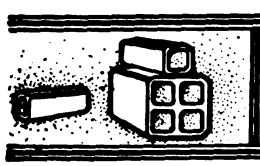
UNDERGROUND.

OTTAWA, CANADA.—The Bell Telephone Company has requested permission to lay conduits on certain streets.

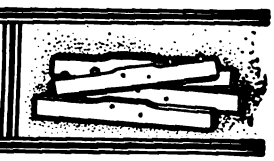
ST. PAUL, MINN.—The city authorities are endeavoring to have the Twin City Telephone Company lay conduits on several streets, taking down its overhead wires.

AMSTERDAM, N. Y.—The Automatic Telephone Company has been given permission to place its wires underground.

UTICA, N. Y.—The Central New York Telephone Company has appropriated $50,000 for the purpose of extending the subway system in Utica.



New Construction in the Field



FRANKLIN, ARK.—The Sharp County Telephone Company will construct a line from Franklin to Melbourne by way of Philadelphia.

PINE BLUFF, ARK.—The Pine Bluff Telephone and Telegraph Company has announced that it will erect a brick building to be used as an office and will lay the majority of its wires underground. It is probable that a new exchange equipment will be installed in case this is done.

MONROE, GA.—W. W. Watkins, manager of the Monroe Telephone exchange, is re-constructing several of its lines.

PECATONICA, ILL.—The Winnebago County Telephone Company will soon install a complete new office equipment in the local exchange.

RUSHVILLE, IND.—The Rushville Telephone Company is spending $7,000 in improvements, which are necessary on account of the company's increased business.

ANGUS, IA.—The Green County Telephone Company will construct a new line to this town.

ELDORA, IA.—The Eldora Mutual Telephone Company is placing a new section of aerial cable to take care of the increased business.

MANSON, IA.—The Mutual Telephone Company will expend $4,000 in improvements to the local exchange.

SHELL ROCK, IA.—The Shell Rock Valley Telephone Company is contemplating the erection of a line from here to Powersville, if the rural business will warrant the maintenance of the line.

ST. JOHN, KAN.—The St. John Telephone Company is replacing its automatic switchboard with a new manual board.

BOWLING GREEN, KY.—The Home Telephone Company is arranging to install exchanges in Woodburn, Smith's Grove, Morgantown and other places.

MACHIAS, ME.—The Washington Telephone Co. has completed the work of constructing the line from Machias to Roque Bluffs.

BATTLE CREEK, MICH.—The Calhoun County Telephone Company has opened up a new territory in South Michigan and North Indiana for toll line service.

CADILLAC, MICH.—The Citizens Telephone Company will build an extension of its line to Boon and Harietta in response to a petition of Cadillac merchants.

GREAT FALLS, MONT.—The Farmers Telephone Company is planning the construction of an Independent line to extend from this city to Black Butte.

HOOPER, NEB.—The Hooper Telephone Company is rapidly extending its lines into all parts of the country in this vicinity.

TILTON, N. H.—The Citizens' Telephone Company is putting in a line to Northfield Center and expects to continue it to Canterbury. The completion of this line will give telephone services to nearly the entire town of Northfield.

BUFFALO, N. Y.—The Inter-Ocean Telephone & Telegraph Co., of Buffalo, N. Y., has announced that a trunk line from Buffalo to Jamestown will be completed by about October 20th. This line is a part of the extensive long distance system of the Inter-Ocean Company, which company has something over 1,000 miles of long distance lines in western New York, and gives service to about 65,000 Independent telephone subscribers.

CANASTOTA, N. Y.—C. J. Wood of Utica, director of the Canastota Telephone Company, was here recently and stated positively that work on the local exchange would be commenced before November 1st.

FORT EDWARD, N. Y.—The Adirondack Telephone Company will at once begin to string wires and install the telephones.

KINGSTON, N. Y.—The Columbus Telephone Company recently stretched a submarine cable 3,400 feet in length across the Hudson river.

WARRENSBURG, N. Y.—The Adirondack Telephone Company will extend its system to North Creek, Stony Creek and Luzerne.

ALICE, OHIO.—A new telephone company has been organized to run a line from Ewington to Buck Eye Furnace.

NORWALK, OHIO.—The Oil Belt Telephone Co., incorporated a few days ago, will build exchanges at Cygnet, Portage and Jerry City, Wood County, with connections and free service with the Independent exchange at Bowling Green. One hundred and fifty miles of wire will be strung and 400 telephones installed.

ALTOONA, PA.—The Altoona and Logan Valley Railway Company will install an Independent telephone system along its right-of-way, utilizing the telegraph poles and wires.

CONESTOGA, PA.—The Conestoga Telephone and Telegraph Company has completed arrangements for the connection of its lines with the Consolidated Telephone Company at Reading. Mr. Hartz of Morgantown has secured 21 subscribers in Birdsboro for his company.

DUBOIS, PA.—The Summerville Telephone Company is preparing to expend between $12,000 and $15,000 in rebuilding its system in Dubois, installing new switchboards, etc.

WALTERBORO, S. C.—The Colleton County Telephone Company is putting up a line between here and Cottageville.

ASHLAND CITY, TENN.—Citizens of this place, at a meeting held recently, formulated a proposition which was forwarded to the Home Telephone Company of Clarksville, asking that company to run lines to that city and establish a local exchange.

TULLAHAMA, TENN.—A new telephone system will be installed here by a home concern.

BUDA, TEX.—Paul Crews will establish a telephone system connecting the inland towns with Buda.

SHERMAN, TEX.—Five carloads of material for the construction of a long-distance Independent telephone line to complete the circuit from Sherman to Texarkana, have arrived. The line has already been completed between Texarkana and Bonham and it is expected that the remainder of the line, from Sherman to Bonham, will be finished before November 1. A line, connecting with the Grayson County Telephone system, will be built also to Gainesville by way of Whitesboro.

PORT ANGELES, WASH.—W. B. Main of Blyn has sold his telephone line to a company which has been organized to develop the country surrounding Blyn.

WHEELING, W. VA.—The Western Va. and Western Telephone Company will extend its line to Newport.

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TRADE NOTES.

THE CONTROLLER CO. OF AMERICA, 1061 Monadnock Block, Chicago, has issued a novel little booklet, entitled "Something About Tokens." It is well written, and solves some difficult riddles that have bothered the people who believe in measured service, yet do not see how they can make it hitch.

MERRITT AND CO., 1010 Ridge avenue, Philadelphia, Pa., has been awarded contracts for complete installations of its expanded metal lockers. These lockers are the most sanitary in use at the present time and are also the most substantial. The company will be pleased to furnish catalogues and samples of the metal to all parties interested. Correspondence solicited.

FRANK B. COOK, of Chicago, has recently sold to the Monroe County Telephone Company, of Sparta, Wis., one of his well-known type L distributing frames equipped with No. 44 protector. The board has a capacity of 600 pairs, and is now equipped for 300 pairs. The company expects to make additions in the near future, and it will probably not be long before the capacity will have to be increased.

THE AMERICAN ELECTRIC TELEPHONE COMPANY has recently shipped a complete equipment to the Topeka Independent Telephone Co. to be used as a branch exchange in the High School at Topeka. It has also made a recent shipment of a magneto switchboard to Beloit, Kansas, and has also designed and shipped a 500-line capacity Bell Express board, which possesses a very complete arrangement for rendering toll service.

THE MOUNTAIN STATE ELECTRICAL CO., of Wheeling, W. Va., has recently received a number of large orders for the Hall Cable terminals. A large order has been received from the Mutual Telephone Company of Des Moines, Ia., for its special hardware for cable construction. The company reports exceptional business in all its branches. Parties in the market for line and cable construction material should communicate with the company, as it has a number of attractive specialties.

THE CENTURY TELEPHONE CONSTRUCTION CO., of Buffalo, N. Y., has begun active operations in building exchanges at Geneseo, N. Y., for the Geneseo Telephone Company, and at Holley, N. Y., for the Holley Telephone Company. The Century Company has contracted to build the entire outside wire and cable plant, and to build and furnish the central station and substation equipment. The switchboard will be the Century's product in the way of the common battery visual signal.

THE AMERICAN STEEL AND WIRE COMPANY, of Chicago, New York, Denver, Worcester and San Francisco, has issued a descriptive bulletin of wire rope. This is intended to illustrate the various types of wire rope made and for what special purposes they are used. This company manufactures wire rope of every description and also copper cables and strand for electrical purposes. Having sales offices in all the principal cities, it is in an exceptionally good position to fill all orders promptly and to furnish any information required at the shortest possibe notice.

THE DAYTON MANUFACTURING CO., of Dayton, Ohio, has recently issued its third catalogue of Silvey Storage Batteries. The catalogue gives a thorough description of this type of cell, together with a full detail as to sizes, capacities, etc. This firm has recently purchased the entire business and good will of the Columbus Storage Battery Company and is now in an especially good position to furnish all types of cells at the shortest notice. This new catalogue will be furnished upon request and any other information will be cheerfully furnished by the company.

THE BAIRD MANUFACTURING COMPANY, of Chicago, manufacturers of Baird Pay-stations, is selling a large number of their No. 130 Portable Restaurant and Hospital Set Pay-stations. These machines are equipped with an iron back to contain ringer, induction coil, etc., and have a handle plate on the top for carrying about from place to place. This makes a telephone set and Pay-station which is self contained. This machine is meeting with great favor among telephone companies and one large company is constantly buying them in 25 and 50 lots at a time.

THE WESCO SUPPLY CO., of St. Louis, has secured the services of Mr. H. P. Didriksen, who takes charge of its Telephone Department and advertising. Mr. Didriksen's experience in both branches of the work fits him peculiarly for his new position, and the good reputation of "Wesco" telephones, together with the company's prestige in the electrical trade generally, will doubtless prove of much mutual advantage. Mr. J. W. Krueger, who has recently been handling the company's advertising, and who has had charge of the very attractive exhibit of the Wesco Supply Co. at the World's Fair, again takes up his work in Mexico, where the company is developing a very promising business.

THE CONNECTICUT TELEPHONE AND ELECTRIC COMPANY, INC., Meriden, Conn., has placed upon the market two new designs of linemen's portable testing sets. These instruments are styled No. 18 and No. 31, each being the same size, 5½x7½x3¾. No. 18 is designed along the same line as the Bell test sets and contains a generator and polarized buzzer. A two-point switch is included to control the ringing and talking circuits. This instrument is wired for either series or bridging as desired. The No. 31 is a complete telephone and includes the latest types of transmitter, receiver, ringer, and generator. It is designed to work any distance and is used for all kinds of electrical testing and is also in general use by the army and street railway companies. For the latter class of service a plug and cord can be furnished and weatherproof Jack boxes for mounting or poles. Parties interested should write for particulars and bulletins.

THE FRANKEL DISPLAY FIXTURE COMPANY, of New York, has placed upon the market a patent wire testing clip that possesses exceptional merit. This clip is intended to make connection with any line it is desired to test, whether insulated or not. This result is accomplished by means of a pointed stud which is fastened on the inside of the clip and so arranged that when an insulated wire is introduced between the jaws of the clip the point of the stud is forced through the insulation into contact with the conductor. The edges of the jaws are provided with teeth which prevent the wire from slipping. These clips are used by all the largest telephone companies in the country and by the number of repeat orders received are certainly all that is claimed for them. Besides being simple this clip is practical, consequently it is finding a ready market. The company has for distribution a folder which illustrates a number of repeat orders and also gives prices.

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Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

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WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED.—Position of responsibility, by practical telephone man, married. Iowa or Missouri preferred. Address GEO. A. BISHTON, Cedar Rapids, Iowa, care Telephone Co. 262

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

WANTED—No. 2 and No. 21 second-hand Western Electric Bells. Address Box 260, AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 260

WANTED—A man experienced in long-distance telephone work, and familiar with composite circuits. Address New York, Box 261, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 261

WANTED—Bright young man of good appearance, who understands thoroughly technical telephony. One who has worked in the field preferred. Must be able to write descriptive booklets on telephone apparatus. Exceptional prospects for the right man. Address Box 242, care of THE AMERICAN TELEPHONE JOURNAL, New York City. 242

WANTED—Position as wire chief or manager of exchange of 500 subscribers; magneto or common battery; experienced in line construction and central office maintenance; best of references. Address Box 264, AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 264

WANTED.—Manager of exchange of 300 common battery and magneto telephones, located in New York State. Good salary at start, and steady increase to right man. Only hustlers who want and can earn good pay need apply. Address Box 259, care THE AMERICAN TELEPHONE JOURNAL, N. Y. 259

WANTED.—Long distance traffic accountant. Give experience and reference. The Kansas City Home Telephone Company, Kansas City, Mo. 263

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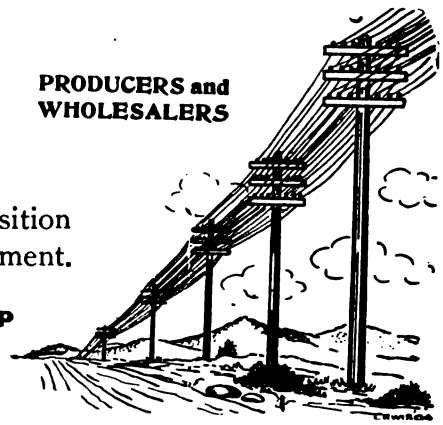

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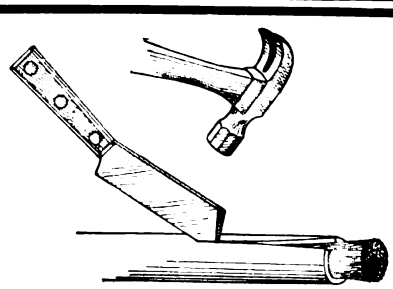

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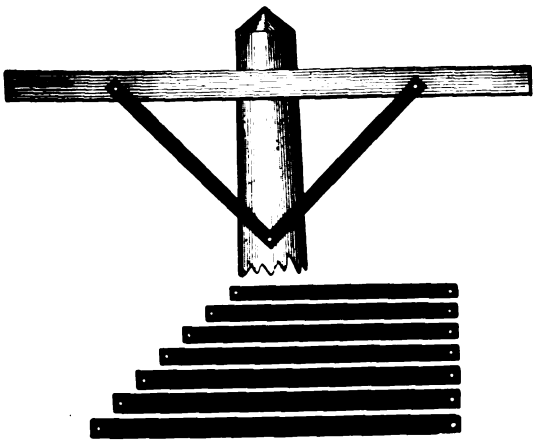

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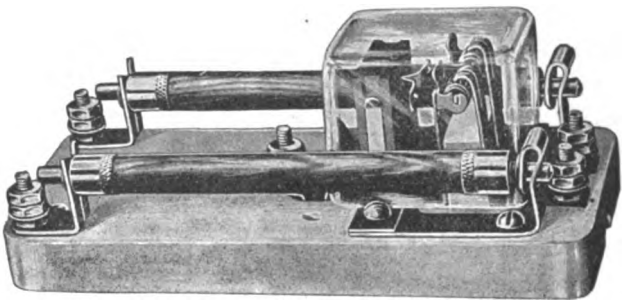

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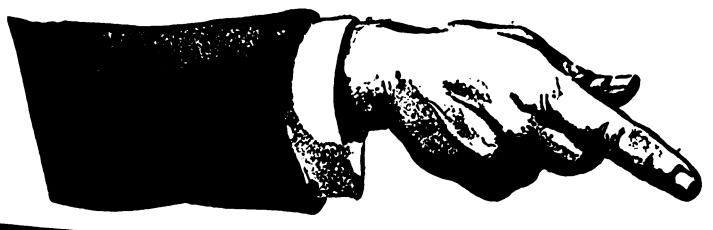

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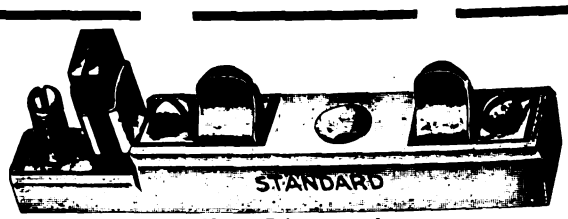

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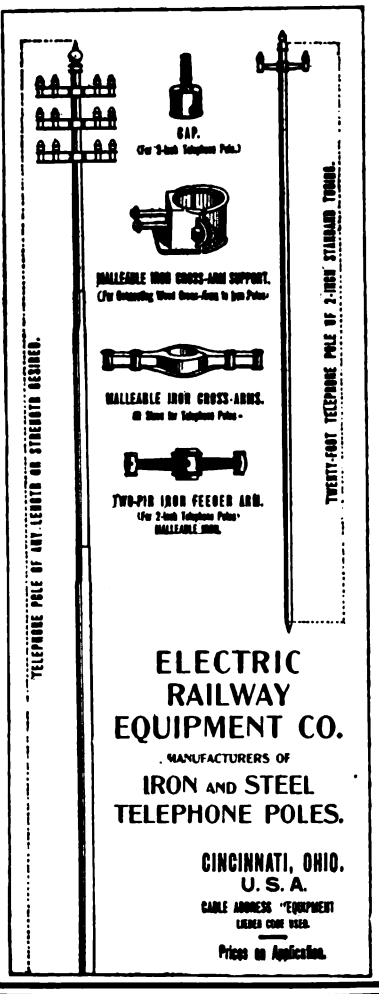

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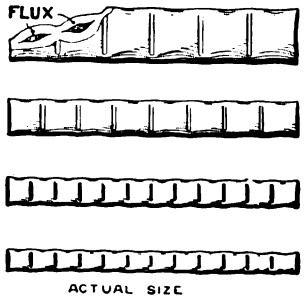

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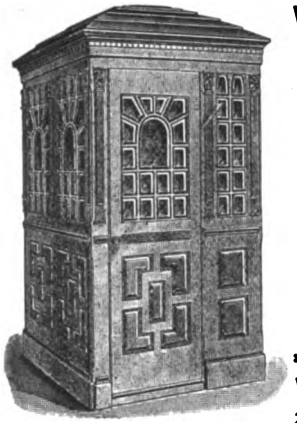

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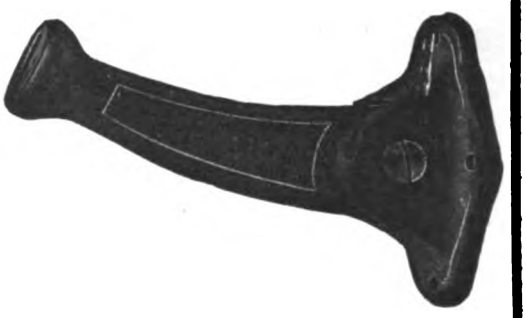

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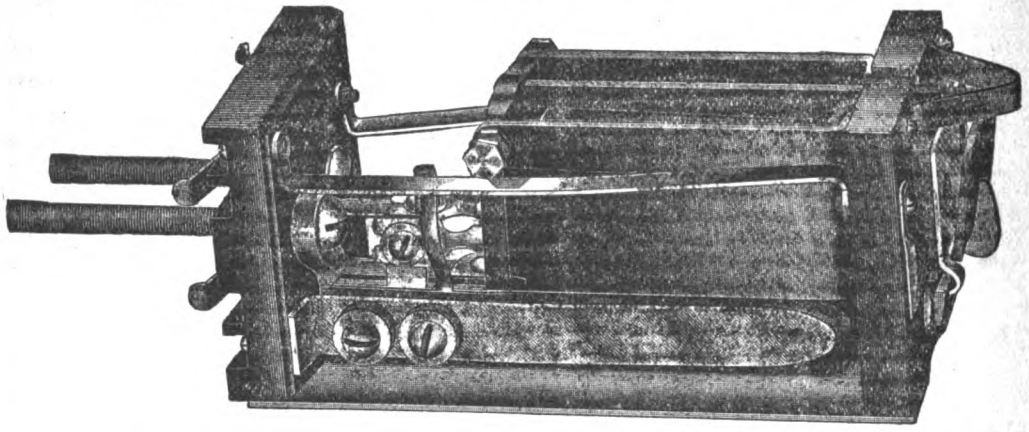

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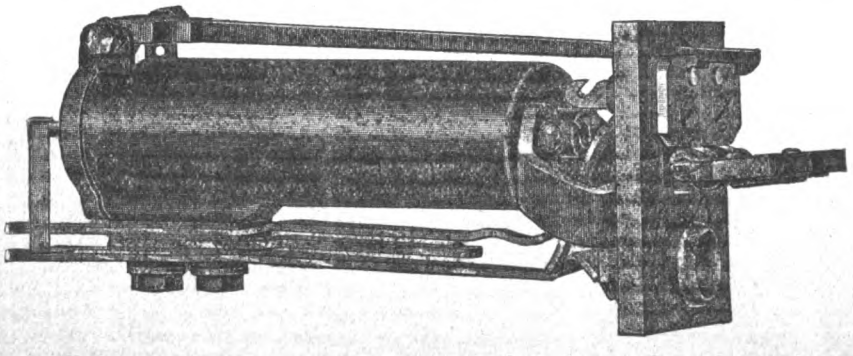

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Here is a letter received this week which we believe is fully self-explanatory. It is incidentally a clear statement of a fact that we have known for a long time, and that we have laid much stress on. For reasons which are easily understood, the name of the writer is not given. The letter follows:

> "To-day for the first time I saw your Journal, and although I am an employee of the 'Bell' Company that you 'roast,' I think your paper is invaluable to anyone interested in Telephony, whether actively or not. I want my subscription to start as soon as possible." C. P.,
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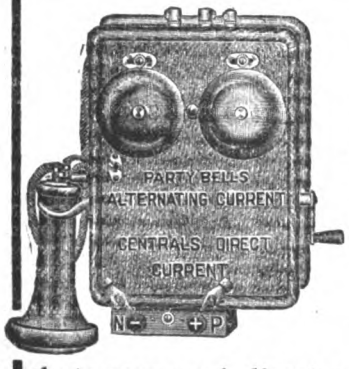

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Relay responds promptly to very weak **direct** current, either pulsating or continuous, **negative** or **positive** as desired.

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Ringing on your Farmer's or Party lines when the subscribers are listening on the line?

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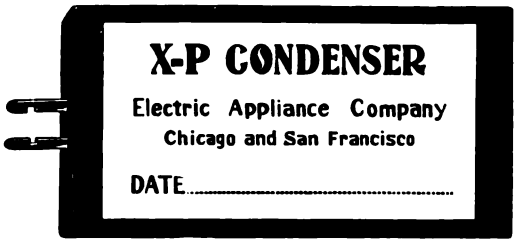

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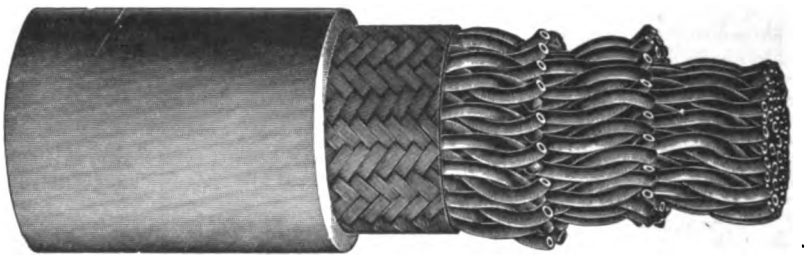

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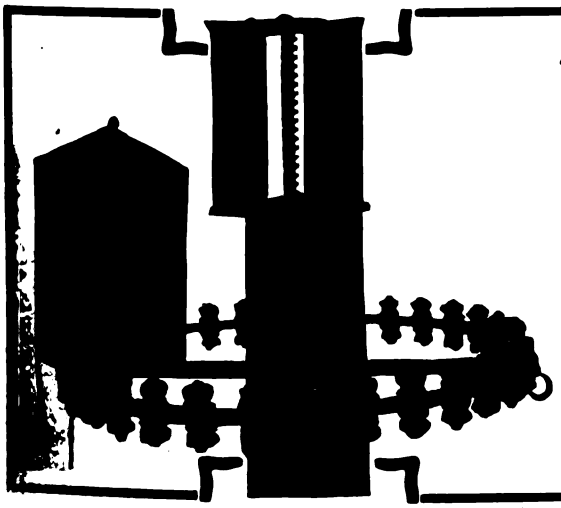

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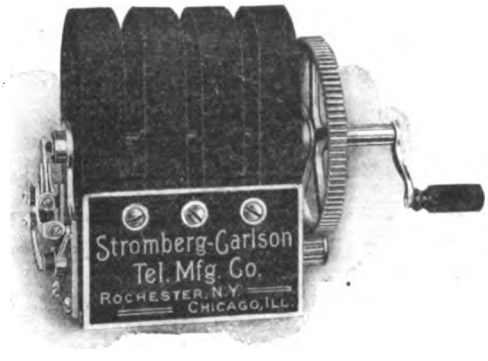
These Illustrations Will Give You a Good Idea of their Appearance

We realize that appearance is not what interests you the most, and will therefore show you their parts in the next issue of this paper and tell why these are the best generators made.

No. 20



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No. 24

They are unlike any others. In the meantime we would be glad to mail our complete bulletin No. 11-B, describing this apparatus.

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General Offices, Rochester, N. Y. Western Sales Office, Chi

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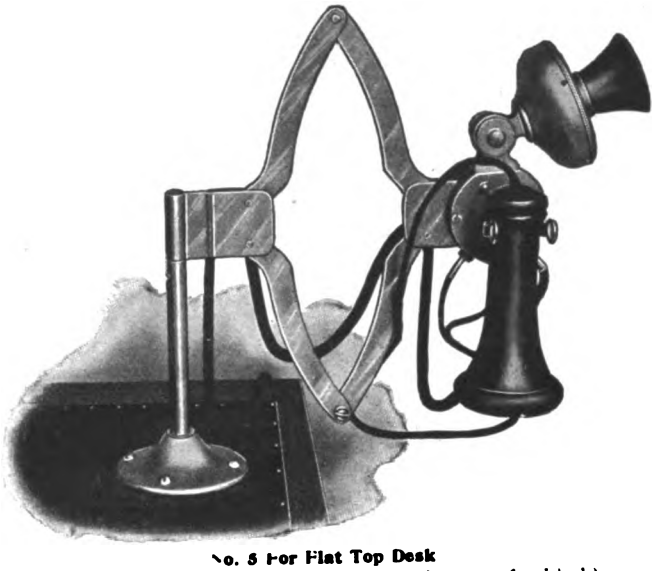

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The Adjustaphone is used by many of the largest Exchanges in the world, both Independent and Bell.

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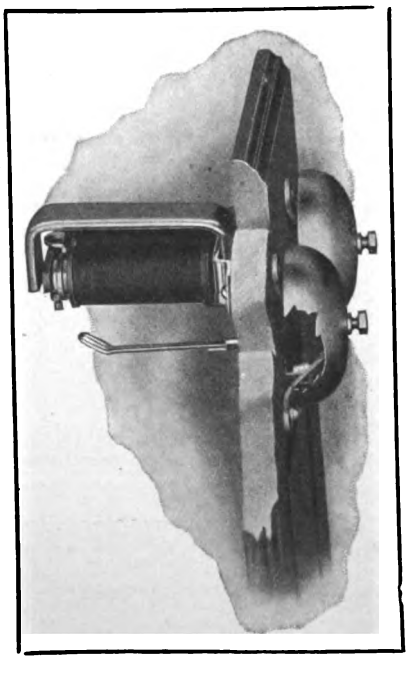

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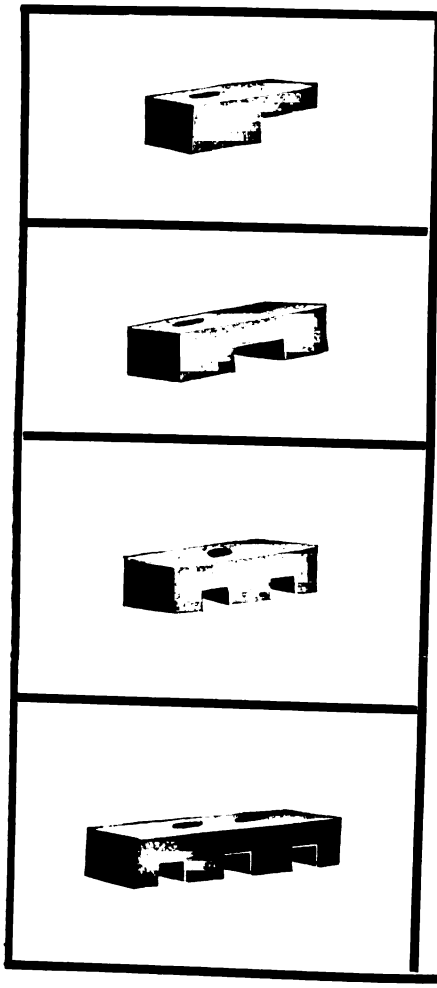

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is just what you have been looking for. A non-destructible cleat, smaller and neater than wood or porcelain, furnishing perfect insulation.

An absolute necessity for good results in office or residence installation.

Hundreds of Telephone Companies use them, many buying in five and ten thousand lots.

Made in Red, Gray and Black. Please state which color you want when ordering.

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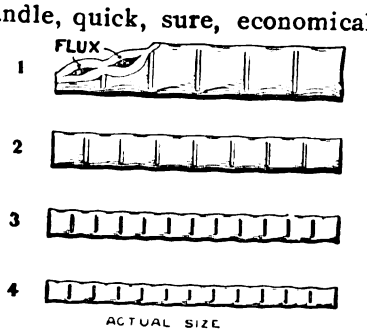
If you want solder that will flow quickly and surely to place and leave smooth work without losing time in preparing or applying flux acid, get

Kester Self-Fluxing SOLDER

Clean to handle, quick, sure, economical and convenient.



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TELEPHONES AND SWITCHBOARDS

Second Hand but Reconstructed

in a manner which guarantees

Original Appearance and Operating Qualities.

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At the Louisiana Purchase Exposition

FOR TELEPHONE SYSTEMS AND APPARATUS

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LOS ANGELES	CLEVELAND	PHILADELPHIA
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THE HIGHEST AWARD GIVEN

BE SURE TO SEE OUR EXHIBIT WHEN YOU VISIT THE FAIR

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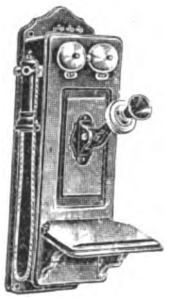
A very simple system for all Farmer and Rural Lines, by which the subscriber calls at will any other subscriber on the same line without calling central: calls central at will without calling any other subscriber. This system pleases the subscribers, saves much time to the operator, and makes the service entirely satisfactory. Ask for particulars. You will want it. We manufacture a great variety of Telephones, Switch-Boards and Specialties. Ask for catalogue M and our laughter-provoking novelty.



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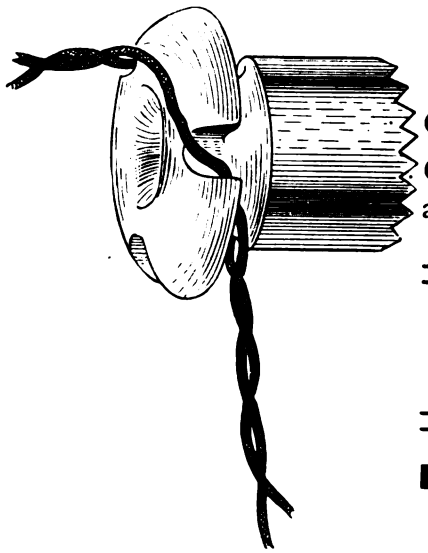

No tie wires

Can't pull off.

Can run wires in any direction.

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Price per M $20.00

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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

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Embodies the highest ideals in mechanical Pay-Stations. ... ...

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Flipper, Loud Signals,
Rejector Pocket, Air Valve,
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Muffler on gong, Combination Lock,
Low Maintenance cost,
Space for batteries.

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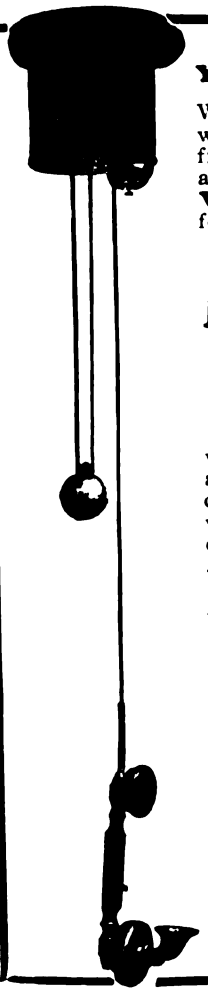

YOU KNOW HOW GROUCHY

We all are in figuring costs; how we will work and contrive to cut off even a cent from a product that it costs dollars to make and market?
Well, when on the first of last August we found it necessary to increase the price of

THE

Pendent Telephone

ONE DOLLAR

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WE WERE APPREHENSIVE, but need not have been, for sales and inquiries have very largely increased since the date named; and there is no more anxiety that the **instrument** may be blamed for a fault in the **cord.** Send for fully equipped telephone with **twenty-four advantages** over all others.

THE VOUGHT-BERGER COMPANY,
MAKERS OF FIRST-AWARD
Telephones, Switchboards and Appliances,
La Crosse, Wisconsin

Only Three

No. 19.

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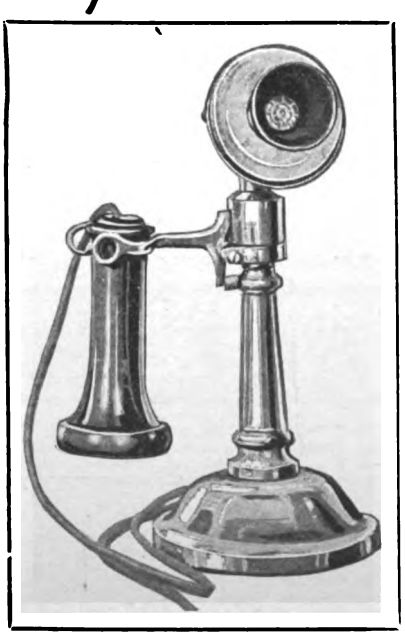

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DESK STANDS

No. 122.

We only make **Three Types**

Each in a class of its own.

PLATINUM CONTACTS

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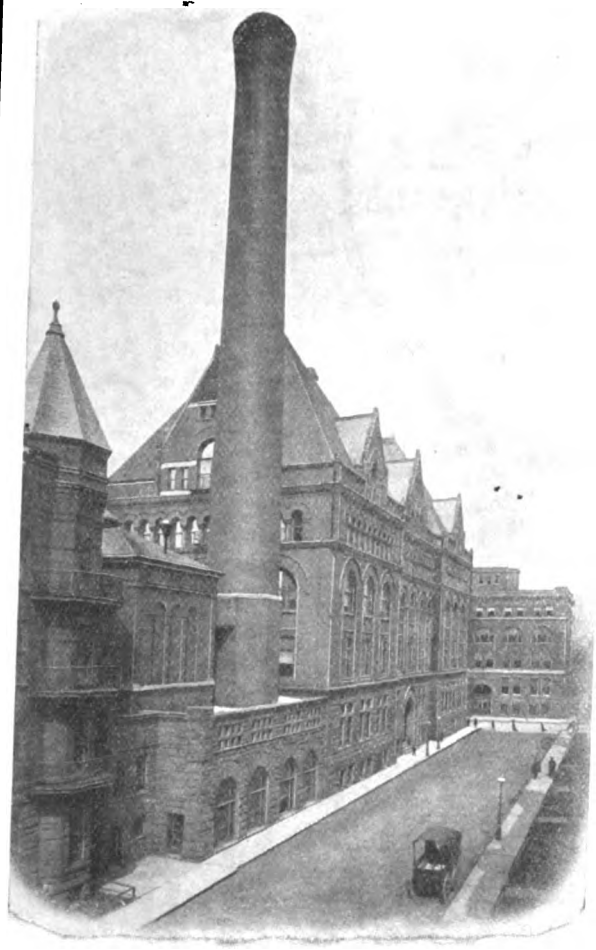
WANTED

Telephone Men Desiring Better Positions



Main Building, Armour Institute of Technology

TO ALL TELEPHONE MEN WHO WANT TO BETTER THEMSELVES

Perhaps you can't afford to quit work and attend a school to secure the technical training and educating that will bring you advancement.

You may be a troubleman, lineman, switchboard-man, inspector or wire chief. Naturally you aspire to be manager of your exchange some day.

You may be manager of a small exchange and have ambitions to manage a large exchange; or possibly you are in charge of a large exchange but wish to become general manager or superintendent.

You are faithful and conscientious in your work. But something is lacking. You can get so far and then you have to see younger men forge ahead of you. You feel the need of technical training to advance. And yet you can't afford to give up your working time.

THE

American School of Correspondence

....at....

Armour Institute of Technology

will solve the problem for you.

Here you can secure the necessary technical education to fit you for the highest positions in the telephone and other electrical industries.

You don't have to stop work,—merely study in spare moments and recite to us by mail. Your recitations have the personal attention of members of the faculty of a widely-known engineering college. Through them many of the advantages of the splendid equipment,—testing laboratories, experimental shops, etc.—of Armour Institute of Technology, representing an endowment of over one million dollars, are brought to you in your own home.

Write to-day for catalogue and full particulars. Tell us what your position is, and what you want to be.

American School of Correspondence

.....AT.....

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CHICAGO, ILL., U. S. A.

Readers of the American Telephone Journal enrolling before November 15th will be furnished free of charge a set of our new 12 vol. Reference Library Modern Engineering Practice. This work covers the subject of Telephony, Electrical, Steam and Mechanical Engineering. It is bound in three-quarter Morocco, contains over 6,000 pages 8 x 10 in size and is the most comprehensive and up-to-date cyclopedia of engineering yet published.

In answering please mention AMERICAN TELEPHONE JOURNAL of October 29th.

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WHEN YOU USE
SWEDISH-AMERICAN APPARATUS
YOUR BRAINS ARE PAYING
DIVIDENDS

SWEDISH-AMERICAN TELEPHONE CO. CHICAGO

REDUCE MAINTENANCE COSTS
MAKE PROFIT FOR STOCKHOLDERS

USE THE

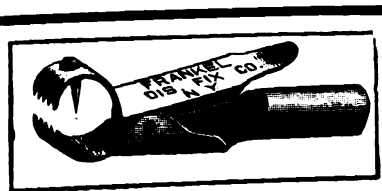
Benbow Adjustable Swinging Bracket

Save cost of broken mouth-pieces, receiver shells, loose connections.

AGENTS WANTED

Free Sample to Telephone Companies on Trial.

THE BENBOW COMPANY, Manufacturers,
14 South Broad Street, PHILADELPHIA, PA.



Patent Applied For

Your Employees Accomplish 1/4 More in a given time if you furnish them

WIRE TESTING CLIPS

Make instant, positive test Connection on any size wire without removing insulation. Cost almost nothing; saving of time in a single day pays for them.

In 1 Dozen lots, 12½c. each
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In 500 lots, 10c. each.
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LOCKERS

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The American Telephone Journal

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VOLUME 10 SATURDAY, OCTOBER 29, 1904 NUMBER 18

THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER

ARTICLE II.—AN EXAMPLE FROM PRACTICE.

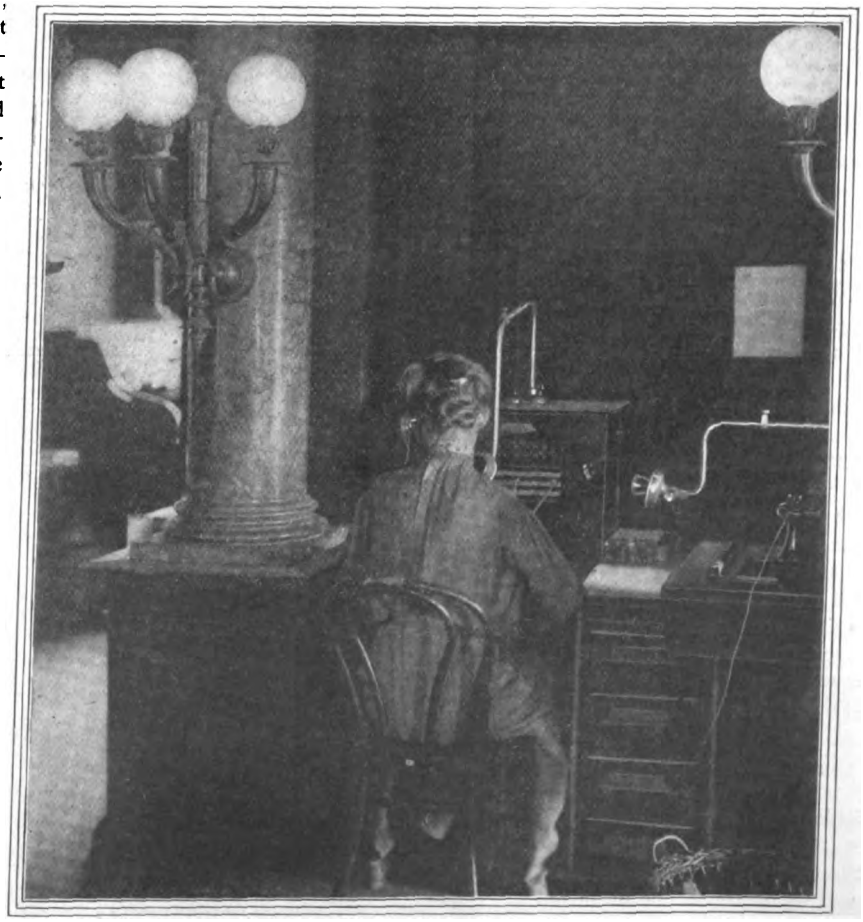
By Robert Louis Jamieson.

Editor's Note.—In the preceding number a few of the salient advantages both to the subscriber and the operator of the private branch exchange were pointed out. It is now our intention to quote some examples from actual practice in order that our readers may gain a further insight into the possibilities of the private branch exchange from the standpoint of the operator, and we here present our readers with an account of the methods used to secure the business in Philadelphia, as detailed by a valued correspondent.

PRIVATE branch exchanges have always been looked upon as a luxury in which only the largest and richest corporations might indulge. But in Philadelphia—the sleepy town, according to its critics—this idea no longer has place. Such systems are held a business necessity by even the smallest firms, factories and corporations. It must not be thought that this reversal of opinion sprang up over night; that it came without concentrated and laborious effort, or that it was due to the demand of Philadelphia business men for private exchanges. Such changes are not effected in a day or a year, nor do they come without hard work on the part of someone. Business men, as a rule, are like the gentlemen from Missouri—"You have got to show them."

Until the Keystone Telephone Company was established in the early part of 1901, the private branch exchange business in Philadelphia was limited and practically unveloped. The Keystone is the largest Independent telephone company, and its field of operation is the greatest at present occupied by an Independent company.

Its promoters, and especially its general manager, early determined to make a special effort for private branch exchange business. Their success in less than four years' time has been truly remarkable, and the financial returns have amply rewarded their persistent efforts. At the present writing, the Keystone Company operates nearly two hundred private branch exchanges, each with at least ten stations, and connected by one trunk or more with one of the six main exchanges.



Private Branch Exchange of Keystone Telephone Company, Installed in the Booklover's Library, Philadelphia, Pa. Thirty-eight Stations Installed, ten Cord Circuits, one of which is used for a Special Long-Distance Trunk. Average number of out-going Trunk Calls 138 and incoming 80. This does not Include the Intercommunicating Business of the System.

Its rates for private branch exchange service are as follows: For the first trunk line, the charge is $80 per year; for each additional trunk, 60 per year. $20 to $50 annual rental is charged for a switchboard, according to its size, including the operator's set. Stations are charged for at the rate of $10 per year each. Therefore if a firm has an exchange consisting of switchboard and operaor's set, two trunks and ten stations, the annual income to the Keystone Company is $260. Each additional trunk would bring $60 and each additional telephone $10 annually, and increased rental for a larger board. After the initial installation, we make it our business to see that the equipment is increased to keep pace with the growth of the business.

Although these private branch exchanges bring good returns on the investment to the Keystone Company, the price to the consumer is very reasonable indeed.

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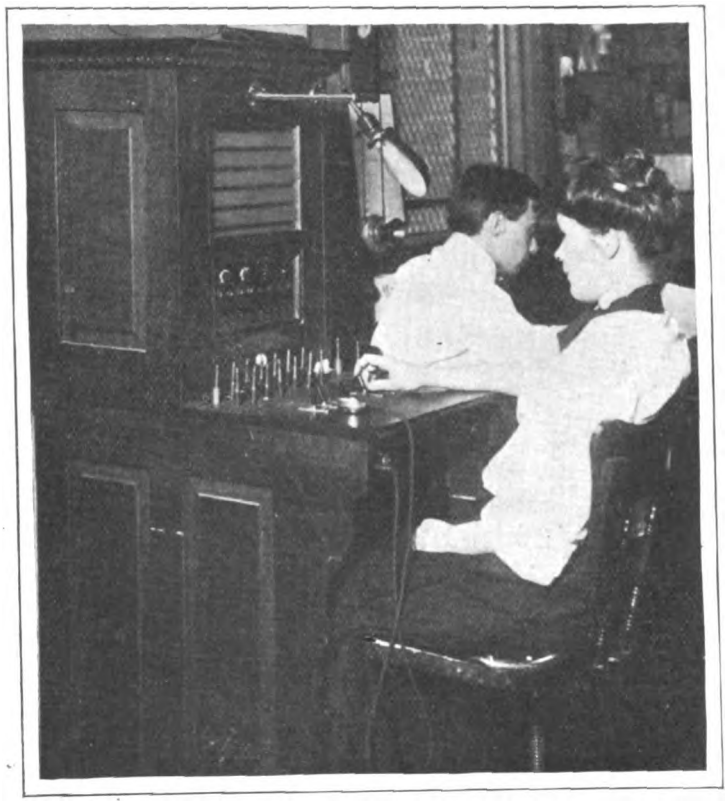
Stromberg Carlson Central Energy Switchboard Installed by Indianapolis Telephone Co. at Vonegut Hardware Company's office. 18 Stations, 2 Trunks, 8 Cord Circuits.



in comparison with the service rendered. Not only is an unlimited service given, but the prices are much lower than the Bell rates for private branches. The Bell Company charges $36 for switchboard and operator's set, $36 for each trunk line, $12 a year for each station and three cents per call. Thus for a Bell branch consisting of switchboard and operator's set, two trunks, ten stations and say 3,600 calls (which is a fair average for such an installation), the average price would be $336 as against $260, the Keystone charge for an unlimited service with the same equipment.

So much for the financial side of the question, which is, of course, of paramount interest to the telephone company. The subject I have been asked to write on is the methods employed by the Keystone Company in securing private exchange business. I have been asked to treat it with the object in view of pointing out that even the smallest telephone company may go after the private exchange business successfully.

The secret of Keystone growth in this respect undoubtedly lies in two things. The first is advertising, and the second, concentration. The company advertises to let people know that it has this class of service and then it concentrates its forces in an endeavor to convince them that a branch exchange is a necessity in their business. The Keystone way is not to wait for them to ask us about this service. It takes the initiative.

A specific example will probably better illustrate this. The company is now working on one of the largest concerns in Philadelphia. It has a direct line Keystone telephone, but it needs a private branch exchange. To convince the company of this is the task. Because of the location of its one telephone in an obscure corner of the store, it is of practically no use. When the head of one of the hundreds of departments is called, he must be summoned by messenger from a distant part of the building, wasting his time, and entailing an exasperating wait on the part of the patron. Busy calls on this line amount to a tremendous total in a single day. The most expert solicitors have endeavored to show the management the advantages of having a branch exchange. They have pointed out the feature of direct and instantaneous communication between departments which would greatly expedite business, and have shown how a patron of the store could at once get into touch by telephone with any department without loss of time to anyone. They have told them that they are losing money by the waste of their employees' time, and business by the failure of patrons to reach them over the Keystone telephone.

So far all this has been in vain. The organization of the central office will now be brought to bear and the solicitors will be furnished with exact facts and figures.

Every call coming for this store will be turned over to the chief operator. If the patron succeeds in getting the connection, but is forced to wait until the party wanted in the store is called to the telephone, the chief operator will endeavor to secure the caller's name and address, and the nature of his or her business, and, if possible, a statement of the annoyance caused by the delay. By tactful handling, the patron will invariably give the chief operator this information, she sympathizing over the annoyance and explaining for what the information is wanted.

In the case of busy calls, the chief operator takes the name and address of the caller, and in the same manner as above learns what department was wanted and the nature of the business. All these facts are noted on cards. At the end of each day, the cards are taken by the traffic department, the information is condensed and arranged in tabulated form. In this shape it is then turned over to the contract department. Here the information is embodied in a letter to the prospective subscriber. An expert solicitor is sent with the letter to the management. When confronted with information showing the lack of telephone facilities, the length of time patrons of the place are kept waiting, the number of patrons turned away by busy lines, and the remarks of these patrons uncomplimentary to the up-to-dateness of the concern, a contract for a branch exchange is a certainty.

About six months ago, a two-trunk exchange was installed in a large department store. All of the above methods had been

Stromberg Carlson Central Energy Switchboard Installed by Indianapolis Telephone Co. in Office of Schmull & Co. 20 Stations, 3 Trunks, 8 Cord Circuits

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brought to bear before their contract was finally secured. Now they have eight trunks.

The arguments used by Keystone solicitors are numerous and vary greatly with the different temperaments of the men they approach.

The star man for private branch solicitation has been in this business for twenty years—nearly all of which were spent with the Bell Company. He says the reasonable rates of the Keystone Company and the fact that it gives an unlimited service are strong cards. He points out that a private branch is a time-saver, and consequently saves money. It saves writing many letters, for the telephone is quicker and more satisfactory and a private exchange renders the telephone easy to use. All that is necessary is to ask the private operator to call such and such a number and call you when the party answers. The intercommunicating feature renders the transaction of departmental business between the heads of firms simple and expeditious without either party leaving his office. It does away with messengers to a large extent, and is a great improvement over pneumatic tubes and chutes which have been used to some extent.

A much greater volume of business can be handled in a given time in any office by means of an intercommunicating telephone system. And an intercommunicating system which also gives connection with outside parties is doubly valuable. Much force should be laid on this argument, for if it is strongly put before the prospective purchaser, it will often secure his business. An effective argument is to invite a would-be user to inspect a branch in another house. After seeing what a convenience it is, he usually wants one himself.

A good private branch solicitor must study the requirements of a firm to which he is trying to sell this service, as well as the peculiarities of the individuals composing the firm. Some businesses have many incoming and outgoing calls, but little interior business. Such a concern needs a small switchboard equipped with numerous trunks. Other lines of enterprise have a vast amount of intercommunication, but few incoming or outgoing calls. Two or perhaps one trunk line will suffice for their needs, but they must have a large switchboard and numerous stations. Still another business has few incoming and intercommunicating calls, but a large number of outgoing calls. For these are installed, say one incoming trunk only, as many outgoing trunks as are necessary and a few stations. One such that I recall is that of a public service corporation. They were among the first subscribers to Keystone branches in Philadelphia. At first they had a small system only. They had a large volume of business with their respective branch offices, but few incoming or intermmunicating calls. Endeavors were made to induce them to add several outgoing trunks, but without success. The trunks they had were kept busy with the few incoming calls.

Finally one day a letter was received complaining of the service and saying the lines were kept so busy with incoming calls of no importance that their important outgoing calls could not be put through. They wanted the company to shut out the incoming calls.

This was the cue. A solicitor was sent immediately. He politely told them it was impossible to refuse a connection when their trunks were open. But he showed them that if they had additional trunks for outgoing business alone, it would solve the problem. He brought their order back with him.

There seems no possible reason to my mind why a company operating in a small town cannot secure this paying class of business. Few towns large enough to support a telephone company, but have not several factories, stores or business houses, which could utilize a branch exchange to advantage. The service can be furnished so cheaply that it is within the reach of nearly everyone, and it is an economical and profitable service for the telephone exchange.

It is not alone profitable in itself from a monetary standpoint, but it is a "business builder." Private branch exchange installation creates a demand for new telephones on the part of non-subscribers. When a firm puts in a private branch exchange, it means they will handle more business by telephone. They will handle practically all of their inter-departmental business by telephone. And the increased facilities will enable other firms or individuals to transact business with them freely and quickly.

Firms and individuals that are not subscribers are quick to see they can save time and money and at the same time deal with greater satisfaction with the firm having a branch exchange, should they themselves install a telephone. Women will realize that since the installation of a private exchange in their favorite department store, had they a telephone, they could give their orders to any department without leaving their homes, and without an annoying delay. They will, in all probability, become subscribers.

Smaller firms which have not thought a telephone necessary and which receive orders from the larger ones having branch exchanges, soon come to understand that if they are to keep this business they must be telephone subscribers.

In this way, a private branch serves as a solicitor for increasing a telephone company's subscribers. I consider them the best paying service a company can handle, and well worth special attention. The same arguments and methods used by the Keystone Telephone Company in Philadelphia are applicable with slight modifications by a small company in any part of the country.

COMPETITION IN MISSISSIPPI

By Thomas Marshall.

THE telephone rate war which has been waged for some time in Mississippi will now be fought out before the Mississippi Railroad Commission, which has jurisdiction and supervision of railroad companies. There are a number of Independent telephone systems operating in the State in connection with the Cumberland Telephone Company. These Independent lines are in most cases incorporated and owned by citizens of the State, and they now charge that the Cumberland is waging a war of extermination against them by cutting rates in their territory to such an extent that they will be ultimately driven out of the field.

A petition has been filed with the secretary of the Railroad Commission by the "Mississippi Independent Telephone Association." This petition is signed by the Ctizens' Long Distance Telephone Company, West Point Telephone and Telegraph Company, Memphis Long Distance Telephone Company, Macon Electric Telephone and Water Company, Starkville Telephone and Power Company, Armory and Tupelo Telephone Company, Booneville Telephone Company and J. C. Cavett Telephone Company.

The petition recites that the petitioning companies are members of the Mississippi Independent Telephone Association, and represents to the commission that they are informed and believe that the Cumberland Telephone and Telegraph Company is making to various farmers' lines in sections where said lines are owned by individuals or clubs of individuals the following rates:

"Said Cumberland Telephone Company to run lines one and a half miles from said Cumberland Telephone and Telegraph Company's exchange to connect with said farmers' lines, furnishing telephones to said farmers at the rate of $5 per year. Also, where said farmers own telephones or boxes, the Cumberland Company furnishes transmitters and receivers for said telephones, and gives service at the rate of $2 per year. We further represent that such rates, and the continuation of such rates means the destruction of

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all Independent telephone companies in the State, and ultimately the power of greater extortion by said company upon the people."

The petition further recites that the Cumberland is extending its lines into all sections of the State, and charges that "the aforesaid rates are made for the purpose of crushing out legitimate competition, which in the end means exhorbitant rates to the people of Mississippi." It is therefore prayed that the commission will investigate the rates, as above set forth, and fix a reasonable maximum and minimum rate, applicable to all rural lines, not to exceed $3 per month, nor less than $1 per month.

THE MAINTENANCE AND OPERATION OF SMALL CENTRAL OFFICES

By A. Dallam O'Brien.

THE small rural central office handling from 50 to 500 lines is not subject to the same conditions that govern the operation of large city offices. The advantages of a specially designed building and cable entrance are lacking, and such companies are unwilling to expend the money necessary to supply the office with all the conveniences and aids to maintenance and operation that can be afforded in larger ones. So the man in charge of an office of this kind must become a creature of expedients and constantly design and discover new schemes whereby he can give the best possible service to subscribers with the least expense. It is the purpose of this article and those which follow to consider some of the more important features of this class of the telephone business and point the way whereby difficulties in operation may be successfully met.

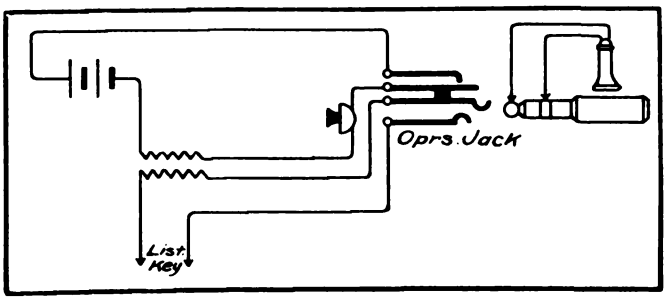

Fig. 1.

One of the most important functions is that performed by the operator's telephone set, for transaction of business is dependent on ready wires for instant service. So it is essential that the wiring be done in a way to court the least possible trouble, and if trouble should arise the circuit must be so arranged as to be readily inspected and the trouble removed. The transmitter batteries are subject to a different set of conditions than those governing the batteries at the substations, as it is customary to arrange the operator's circuit so that the primary circuit is closed during the entire time the operator is at the switchboard. This means that there is a continual flow of current from the battery, and while the actual amount may be very small, yet it is necessary that the transmitter batteries should be able to supply this small current continuously without polarization. Polarization is the formation of a film of hydrogen gas on the negative plate,

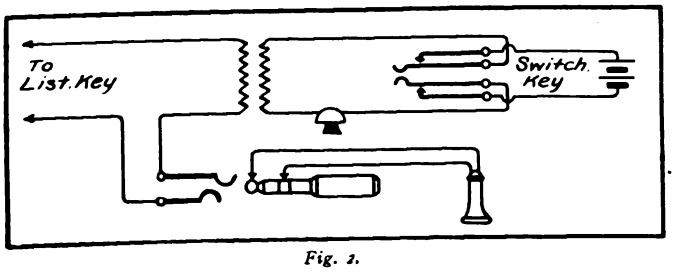

Fig. 2.

that enormously increases in the internal resistance of the battery, which may in time prevent the battery from furnishing the current necessary. In addition the batteries must be of a type which has a low internal resistance.

By referring to Fig. 2 it is evident that when the primary circuit is closed the batteries, transmitter and primary winding of the induction coil constitute a closed circuit. The effect of the voice upon the diaphragm is to cause the transmitter to vary its resistance, and consequently as its resistance changes, the value of the current flowing through the primary circuit changes, the internal resistance of the battery and of the primary winding of the induction coil remaining constant. If, for example, we assume that the battery has an internal resistance of one ohm, the primary of the coil a resistance of ½-ohm, and the transmitter a resistance of 30 ohms, then if the voltage of the battery is 4, the current from Ohm's law $C = \frac{E}{R}$ will be $C = \frac{4}{1 + \frac{1}{2} + 30} = \frac{4}{31\frac{1}{2}}$ .127 amperes. If by talking into the transmitter its resistance is changed or varied so that it is equal to 20 ohms, then the value of the current flowing will be $C = \frac{4}{21\frac{1}{2}} = .186$ amperes, and the difference in current flowing for a change of resistance of 10 ohms in the transmitter is equal to .186 — .127 = .059 amperes. If for comparison we assume the battery to have an internal resistance of 4 ohms, the current flowing under the first condition, as previously stated, will be $C = \frac{4}{34\frac{1}{2}} = .116$ amperes, and with a change of resistance of ten ohms in the transmitter the current will be $C = \frac{4}{24\frac{1}{2}} = .163$ amperes, and the difference in the current flowing in the two cases will be .163 — .116 = .047 amperes.

If we compare the results obtained in these cases, namely, with

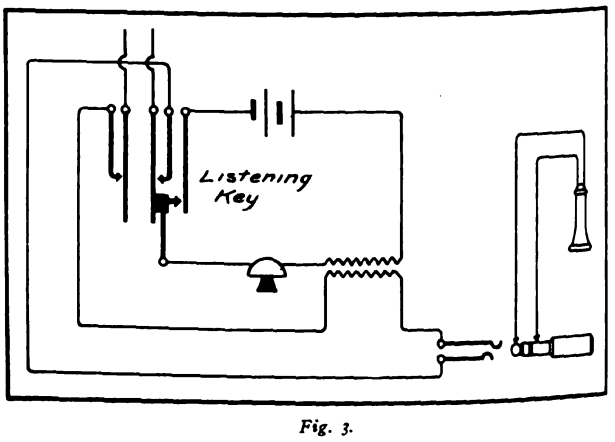

Fig. 3.

a battery having an internal resistance of 1 ohm and another battery having an internal resistance of 4 ohms, it will be seen that in the former a change of resistance of ten ohms in the transmitter caused the current to increase by .059 amperes; while in the latter case the same change only caused an increase in current of .047 amperes. From this it follows that the internal resistance of the battery and the resistance of the leads to the battery should be kept as low as possible in order that the changes of resistance in the transmitter may cause the maximum variations in the flow of current.

The Fuller cell meets these requirements as well as any type.

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In this battery the positive element is zinc and the negative carbon, while the solution, or electrolyte, is made as follows:

Sodium bicromate ..... 6 oz.
Sulphuric acid ..... 17 oz.
Water ..... 56 oz.

The sodium bichromate is first dissolved in the water, and the acid addded slowly to prevent undue heating. Great care should be taken never to pour the water in the acid, as the acid will fly in all directions and painful and troublesome burns may result. The bichromate of soda acts as a depolarizer in this cell, the oxygen in it uniting with the hydrogen which is liberated at the negative pole, forming water. The batteries should be located in a box or closet as close to the switchboard as possible in order that the leads may be short. Each cell has a voltage of about 2.1, and two cells will answer perfectly for the ordinary magneto transmitter. The leads to the board should be at least as large as No. 12 A. W. G. and well insulated.

It is best to avoid as far as possible all intermediate joints and to bring the leads up the side of the board and terminate them at the binding posts to which the transmitter cords are attached. Every joint, whether soldered or otherwise, is a point of weakness and a source of possible trouble. The secondary leads may be run with No. 16 insulated wire, both to the operator's jack and to the listening keys. The manner in which the battery circuit is closed through the primary coil and the transmitter varies considerably. We herewith show three. In Fig. 1 the method uses the operator's receiver jack as a means of closing the circuit. The jack is provided with two upper springs brought into contact as soon as the receiver plug is inserted, and consequently the primary circuit is closed as long as the plug is so inserted. In Fig. 2 the leads from the battery are wired through a key and by throwing the key are connected through the transmitter and coil. The key may be mounted either on the keyboard or in the face of the board within reach of the operator.

The method at Fig. 3 utilizes a spring, and an extra contact placed on the listening key, and is so arranged that current is being drawn from the battery only during the time that the operator is handling a connection, and consequently there is little waste of power. In any particular case the means of accomplishing this result will depend upon the conditions to be met, but one of the three cases cited will apply in almost any instance. The transmitter battery leads, as well as the wires leading from the cable heads to the switchboard, should be so run that they are not liable to be interfered with by persons walking in the operating room. This can be accomplished by building a trough along the floor back of the board and providing a suitable cover.

HINTS FOR WINDING RELAYS

By Klas Weman.

In telephone practice, a certain type of relay very often is required to perform its functions under very different circumstances and conditions from those for which it was designed. For instance, a relay originally built for a certain voltage, may be required to work at a very different potential. In order to be successful, this relay must be wound to the proper resistance with the proper wire and with the right number of turns.

To calculate by the ampere turns—that is, the product of the current going through the windings of the core and the number of turns—is sometimes less convenient than to use the applied pressure or voltage as a basis.

The electrical efficiency, necessary for carrying out a certain desired function of a relay can be used as a constant for the sensitiveness of any particular type of relay, always remaining the same irrespective of the fators I = amperes, E = volts and R = resistance.

In cases where a great number of relays are placed parallel between the terminals of a large source of current, common for all, as in modern telephone exchanges, thereby giving an almost constant voltage for each individual relay, the voltage is a very suitable factor for determining the proper resistance, dimension of wire and number of turns, when a change is necessary.

For example, let us suppose that the relay is designed to perform its functions at 4 volts, and that the number of turns surrounding the active core are 500, with a resistance of 50 ohms. Now, suppose that this relay must work on 20 volts, it must be rewound, and to find the proper resistance in order to attain the same results at 20 volts, the following formula may be used:

$\frac{E^2}{R}$ = constant

where E = volts
R = resistance in ohms.
E^1 = 20 volts.
R^1 = required resistance.

Then $\frac{E^2}{R} = \frac{E^{1\,2}}{R^1}$; and by substituting values

$$\frac{16}{50} = \frac{400}{R^1};$$

R^1 = 1250 ohms.

This is the proper resistance for the relay at 20 volts, which means that the resistances are inversely proportional to the square of the voltages.

If we now consider the relative number of turns in these cases, we find by using the formula:

$\frac{E}{T}$ = constant;

where E = volts.
T = number of turns.
E^1 = 20 volts
T^1 = number of turns required

Then $\frac{E}{T} = \frac{E^1}{T^1}$; and by substituting values

$$\frac{4}{500} = \frac{20}{T^1};$$

T^1 = 2500;

that the number of turns has to be 2,500, or five times as many, which means that the number of turns are directly proportional to the voltages, provided the wire has the same resistance per turn.

Supposing that the wire used at 4 volts has a diameter of 0.2 millimeters, the proper dimensions of wire for using the same relay at 20 volts can be found from the formula:

E.x A. = constant;

where E = volts
A = area of wire in square millimeters
Then if
E^1 = 20 volts
D = present diameter of wire (0.2 m/m)
D^1 = diameter required

$A^2 = \pi \frac{D^{1\,2}}{4}$ = required area,

we have

$\frac{E \times \pi (D)^2}{4} = \frac{E^1 \times \pi (D^{1\,2})}{4}$; and by substituting values

$$\frac{E \times \pi (0.2)^2}{4} = 20 \times A^1,$$

A^1 = 0.00628, required area of the wire, or,
D^1 = 0.09 m/m diameter.

This is the dimension of the wire to be used when the same relay is required to work on a 20-volt system, which means that the areas are inversely proportional to the voltages.

It will thus be seen that the desired facts necessary for determining the proportions of the relay at different voltages may easily be found by using the voltage as a basis for calculation.

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A HANDY INSTRUMENT RECORD

By C. H. Judson.

FIRST of all make a record of every instrument of whatever nature that is received by the company. A good system and one that has proven very satisfactory is to let the storekeeper keep a blotter in which to record the shipments as they come in, entering each instrument by number. The manufacturer's number may be used, but it more satisfactory for the telephone company to number its own apparatus. For this purpose the ordinary adhesive paper numbers may be used, the number, of course, being placed on the inside of the box and *not* on the back.

Style of Instrument_____ No._____

Call No.	Subscriber	Order No.	In	Out

Fig. 1.

In the case of desk sets the manufacturer's number is most satisfactory, since it is difficult to attach a ne wnumber which would be permanent without dissecting the instrument.

The blotter is turned over to the clerk who keeps the record after the shipment is entered and this clerk makes the original entry on the card shown in Fig. 1. This is an ordinary 3 x 5 card and is kept by numbers, with a guide between every one hundred cards. It is immaterial whether each kind of instrument be numbered from 1 up or whether a certain lot of numbers be previously assigned to each variety, but it will be found more convenient to give all desk sets numbers differing from those used for wall telephones, and all central energy instruments numbers different from generator call sets.

After the clerk has entered on the cards the numbers and style of instruments and the date received, the card is filed in the regular drawer for unused instrument record cards.

The storekeeper has on hand a supply of tags of a form shown in Fig. 2, and one is attached to each instrument after having the number and date received recorded on it. This tag may be blue in color to designate an instrument in good order as distinguished from instruments requiring testing or overhauling, for which a red tag is used. As the instruments are issued for installation the installer taking it signs his name on the last line of the tag, the order number and date being filled in by the storekeeper or whoever does the issuing. The cards are sent each day to the clerk mentioned above, who retains it until the installation order comes to him after completion, and after comparing to see that numbers correspond and to get the subscriber's call number and name the data is entered on the instrument record card.

When an instrument is removed it is returned to the storekeeper or the shop and a red tag (Fig. 3) is attached to it and the number and date received is recorded thereon. The instrument is tested, and if no repairs are required the facts are entered on the card, and it is sent to the storeroom where the storekeeper receipts for it on the card, and at the close of each day the shopman turns all tags so signed over to the instrument clerk. This clerk then removes the card from the shop drawer and puts it into the storeroom drawer to be used again as soon as the instrument is again installed. It is advisable for the clerk to remove the card from the subscriber's drawer as soon as the take out order passes him and put it into the shop drawer. Thus he will have all telephones, bells, etc., in the shop in one drawer, all in the storeroom in another, and all in use in others.

No telephone, or any other piece of apparatus, should be taken out without being taken to the storeroom or shop. No instrument should be taken out and reinstalled by a wireman holding two orders, one to take out one subscriber and another to install another. Every telephone should be brought to the office for inspection before being reissued.

Every piece of apparatus in the shop or storeroom should bear a red or blue tag. The shop man will, of course, keep his own shop records of work done on each instrument, as the tag is not intended for this purpose.

The record clerk goes over his shop cards frequently, and if

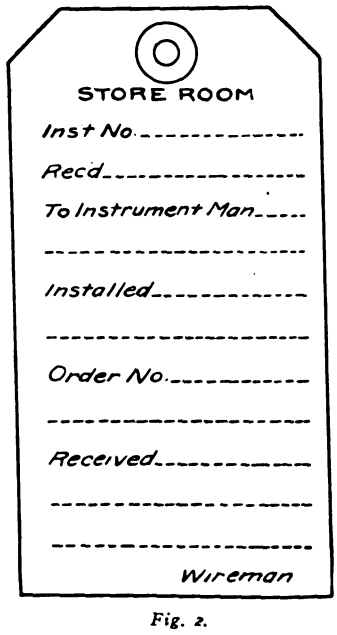

Fig. 2.

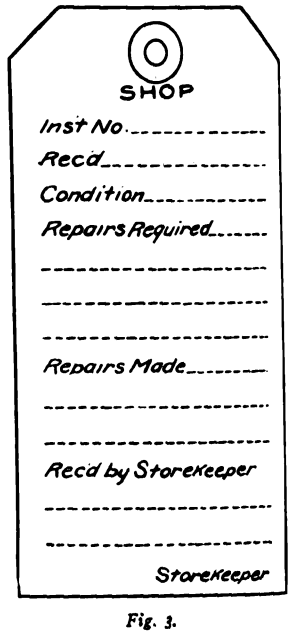

Fig. 3.

apparatus remains too long in the shop reports the same to the proper person. This keeps the shop from getting clogged with a lot of useless stuff as is too frequently the case. The shop man reports all instruments destroyed or too badly damaged for rehabilitation, and the clerk enters such on his "dead list" or transfers the card to a dead box, marking it with the information he has regarding the damage.

It is a simple matter for this clerk to keep an accurate daily balance of instruments showing on a special sheet the exact number of instruments in use in the shop or storeroom, and lost or destroyed. The chances of error are small, and a test of this system covering a period of one year, during which three thousand telephones were installed, showed an exact and true balance at the end of the year as determined by actual count and the auditor's record which was kept from other sources of information for a special purpose.

A PROGRESSIVE OHIO COMPANY.

THE Gratiot and Brownsville Telephone Company, with an exchange at Gratiot, Ohio, was organized May 21, 1904. Since then over 100 telephones have been placed among the business men and farmers in and around Gratiot, Brownsville, Mt. Perry and Hopewell and new subscribers are added almost daily. The company expects to have 150 or 200 by January 1, 1905. The Independent Long Distance Telephone Company and the local company have organized a traffic agreement which will give the telephone users exceptional long distance facilities.

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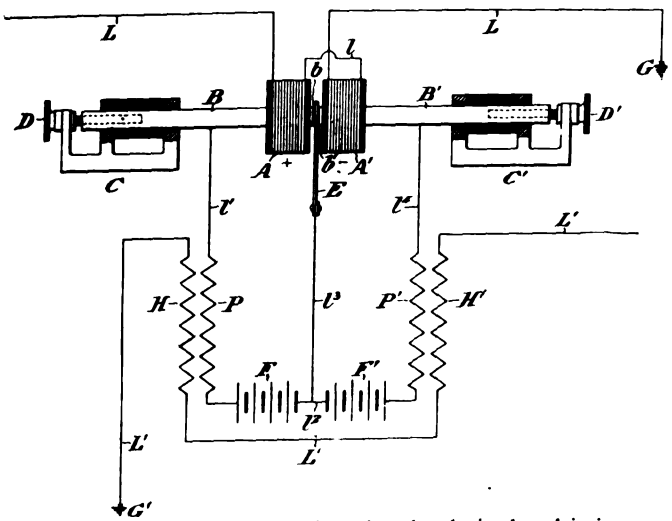
TELEPHONE PATENTS

TELEPHONE RELAY.

I. Kitsee, of Philadelphia, Pa., patents (No. 770,296) a telephone relay and assigns to the Keystone State Telephone & Telegraph Co., of Philadelphia, Pa. The object of this invention is to provide an improved telephone relay. The line wires traverse two coils *A* and *A'* which are placed upon the poles of two electromagnets. Between the poles of these magnets is placed the

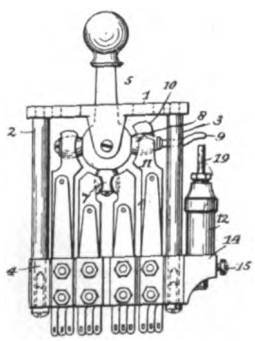


flexible armature *E*, which is of steel and polarized and is in contact with the two microphonic buttons *B* and *B'* that cap the poles of the magnets. Voice impulses traversing the coils *A* and *A'* will attract and repel the polarized flexible armature *E*, and consequently vary the pressure which it exerts upon the buttons *B* and *B'*; these through microphonic action will repeat, and the inventor claims, intensify, the original voice impulses.

AUTOMATIC RINGING KEY.

L. M. Ericsson, of Stockholm, Sweden, patents (No. 770,424)) an automatic ringing key and assigns to Aktiebolaget L. M. Ericsson & Co., of Stockholm, Sweden. The object of this invention is to provide an automatic ringing key which is con-

Fig. 1.



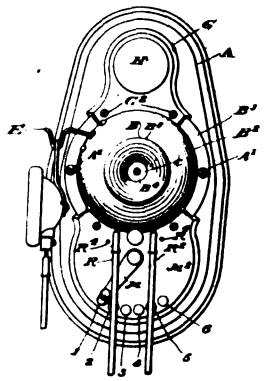
trolled mechanically and not electrically. The mechanism is shown in Fig. 1, from which it appears that the key contains the ordinary ringing and listening springs which are operated by means of a lever *5*. This lever carries a projecting arm *9* which impinges upon a rod *19* attached to the piston of a dash pot. When the key is thrown to the right the arm *9* forces the rod *19* downward, compressing the spiral spring contained within case *12*. This case forms a cylinder filled with some viscus fluid which slowly passes through the piston by means of holes drilled therein, consequently the ringing key will remain set and the ringing current applied to the line as long as the rod *19* is depressed, but as soon as the tension of the spring overcomes the viscosity of the fluid, the key is released and the ringing stopped.

TELEPHONE AND TELEGRAPH SYSTEM.

F. E. Denzer and W. W. Black, of Everett, Wash., patent (No. 769,306) improved telephone signal. This invention relates to improvements in telephone and telegraph systems whereby any number of instruments may be attached to one line or wire in such a manner that any station may signal any other one selectively, and then when the communication has been established a busy signal notifies all other stations that the line is engaged. This invention is based upon the familiarly step by step system, whereby the different stations are provided with electromagnets which operate toothed wheels that by means of the electromagnets may be set in such a position as to allow any station to signal selectively any other one, and which when properly actuated upon the line to all other stations.

TELEPHONE.

W. B. Churcher, of Cincinnati, Ohio, patents (No. 769,304) and assigns one-half to Albert F. Maish, of Cincinnati, Ohio, an improved substation set. The object of this invention is to provide a particularly compact substation set. The arrangement of the parts is shown in the illustration, from which it will be seen



that the hook switch is set inside of a cup shaped metal shield which contains the transmitter. Above this the ringer is placed, while underneath the transmitter a switch is mounted so that the instrument may be used as an intercommunicating set.

IMPROVED MOUTHPIECE FOR TELEPHONE TRANSMITTERS.

I. S. Ashe, of Philadelphia, Pa., patents (No. 772,310) an improved mouthpiece for telephone transmitters. The object of this invention is to provide a mouthpiece for a transmitter so arranged that two persons can use the transmitter simultaneously, and also to provide a valve which shall prevent the entrance of dust into the mechanism of the instrument. The inventor attains his object by providing a double funnel which may be attached to any ordinary transmitter by unscrewing the usual mouthpiece. Each funnel is provided with a sliding diaphragm which operates as a valve to exclude dust.

AUTOMATIC TELEPHONE EXCHANGE SYSTEM.

A. M. Bullard, of New York, N. Y., and L. A. Falk, of Boston, Mass., patent (Nos. 772,023 and 772,024) an improved automatic telephone system, particularly those which are used for intercommunicating circuits in small communities or in factories or large offices. The patents are so complicated that it is impractical to describe them in an abstract, and so voluminous that our space will not permit of their reproduction. We recommend those interested in systems of this description to procure copies of the original patents.

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The Editor's Page.

AN IMPORTANT DECISION ON CONTRACTS.

THE litigation between the Western Union Telegraph Company and the Pennsylvania Railroad Company which has been in progress for some time, has many points that must be of exceptional interest to telephone operators. The contract between the Western Union and the Pennsylvania provided for the construction, maintenance and operation of a telegraph line along the right of way of the railroad company, which was to furnish and place the poles and cross arms, while the telegraph company was to furnish the wire, insulation, and instruments, and operate the line, sending messages relating to the railroad business free, and having itself the commercial business. The railroad company was given the right to string a wire for its own business and the telegraph company an additional wire, and provision was also made for the repair and renewal of the line. The line was built and operated under the agreement for many years, during which time it became an important part of the general system of the telegraph company, which by mutual agreement largely increased the number of its wires, and parol modifications were also made as to the expense of repairs and reconstruction.

The railroad company finally declared that it wished to terminate the contract and threatened to remove the lines of the telegraph company. The latter sought an injunction to restrain the threatened action. The circuit court of the United States for the Western District of Pennsylvania dismissed the suit upon demurrer to the bill of complaint. This action was reversed by the United States Court of Appeals. The court held that as the contract was not revocable at the will of either party, or otherwise limited as to its duration by its express terms, or by the inherent nature of the contract itself with reference to the subject matter or the parties, it was presumably intended to be permanent and perpetual. The relations created between the parties to the contract were not merely personal, as in cases of partnership, master and servant and the like, but rights of property and the user thereof, in the nature of an easement, were conferred on the telegraph company and no right in the railroad company could be inferred to revoke or determine the same at will.

The contract contained one provision that was valid at the time it was made, but had since been declared by statute to be invalid. This was a provision that the railroad company should not permit any other telegraph company or individual to build or operate a line of telegraph along its road. The existence of this invalid provision was held not to affect the validity of the other provisions for which it did not constitute the main consideration. It was also held that a court of equity was not precluded from decreeing the specific performance of a contract because it was continuous in its operation.

A REMARKABLE SHOWING ON THE PACIFIC COAST.

THE results achieved by the Home Telephone Company in Los Angeles, Cal., offer a text for the promoters of Independent competition that should be most convincing to capitalists, municipal officers and the general public. It is doubtful if anywhere in the world a similar progress can be shown. Even the remarkable telephone development that has characterized Sweden, owing to the freedom from Bell influences that that company has enjoyed, is overshadowed by the Los Angeles company.

AN INDEPENDENT OBJECT LESSON.

A conservative estimate of the population in that city to-day shows 155,000 people. The Home Company reports the installation of 20,000 telephones, or practically one telephone for each group of eight men, women and children.

A still more remarkable phase of this company's system is the extent of its private branch exchange business. There are nearly 200 private branch exchanges, some having 300 telephones.

Evidently the business people of Los Angeles appreciate efficient telephone service, and it is also apparent that the Home Company knows how to secure this business.

The system of toll and long-distance lines which radiate from this remarkable city of the Pacific Coast is developed to a point far beyond the expectations of its projectors. North, South, East and West there is hardly a hamlet that has not ample long-distance facilities. At the present time long-distance lines are being projected which will eventually cover the whole of California with a network of lines that will tap every village, and we might almost say, without overstepping the bounds of possibility, every house in this most wonderful and progressive country.

A careful investigation of this development would furnish an education without an equal to those whose interest in Independent telephony is commencing.

It is a fine object lesson in forecasting the future of the Bell situation throughout the country when the Independents settle down to business, for the Los Angeles company has practically driven its Bell rival out of the field as an efficient factor in the telephone situation in Southern California.

NECESSITY OF SIMPLICITY IN PATENT DESIGN.

THE tremendous activity in the telephone industry is particularly noticeable in the number of patents which are being or have been applied for. This shows that the Independent movement has given an unprecedented opportunity for the exploitation of ideas, some, if not all, of which have a very large element of originality and merit.

On an average there are six patents relating to telephony issued weekly. These cover almost every conceivable idea that can be described on paper from most fearfully and wonderfully contrived apparatus for party-line operation to the somewhat novel but simple idea of furnishing two mouthpieces for a transmitter. In many instances a careful consideration of the claims of a patent reveal a very meritorious idea, but unfortunately that seems to be the end of it.

The only apparent reason for this is the haste with which a device is prepared for the patent office. It is generally conceded that the first conception of an idea is generally too complicated, especially if the invention relates to a combination of functions. These complications can only be simplified or eliminated by careful study and much thought. Unfortunately the average inventor rarely thinks of this and rushes blindly ahead with a vague idea, which if more time and forethought had been used might have become a valuable asset instead of only a waste of money in patent fees.

Too much emphasis cannot be placed upon the necessity of care and attention to the simplification of details in the design of a circuit or piece of apparatus. That this is a most important consideration is proven by a review of telephone development.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CONNECTION WITH INTERIOR SYSTEM.

We should be pleased to make inquiry if a recent decision has been made relative to a firm owning outside connections, obliging them to give service to interior systems over their lines. Any information you can give regarding this will be thoroughly appreciated. A. D. L.

THE latest decision on this subject is Gardner v. Providence Telephone Company (R. I.) 49 A. 1004. It was there held that a company might not forbid the use by a subscriber of a private set of extension instruments and refuse him the use of its line where the company was unprepared or neglected to furnish approved appliances of that kind or demanded exorbitant rates, the use of such set by the subscriber causing no detriment to the company either in its demand upon service or in safety.

PENALTY STATUTE AND DISCRIMINATION.

Does a statute prohibiting discrimination by telephone companies require one company to connect with another company? W. M. K.

AS a rule a telephone company is obligated to furnish its instruments and facilities to all persons willing to accede to its terms, and to obey its reasonable rules and regulations. So a penalty statute prohibiting discrimination by telephone companies applies to discrimination between applicants as well as patrons, and such companes cannot refuse to connect two subscribers. But such a statute does not require that one telephone company should connect its system with another company so that the latter may utilize the combined system as its own, and so be obligated only to the payment, for its own messages transmitted thereby, of the nominal sum required of subscribers. But refusal of a telephone company to connect the instrument of a subscriber with that of another patron renders it liable under such a statute as to discrimination and partiality, as the duty imposed does not cease upon furnishing the instrument and connecting it with the exchange. Re Baldwinsville Teleph. Co., 24 Misc. (N. Y.) 221, 53 N. Y. Supp. 574. Joyce on Electric Law; Section 840.

LIABILITY FOR DAMAGE FROM LIGHTNING.

A PLAINTIFF sued an electric lighting company for damages because of the destruction of his house by fire, alleging that the wires that entered the building were not properly insulated. The junction with the house wiring was on the inside of the upper story. This part of the house was not completely floored. The wires entered the house through auger holes in the window casement. There were no porcelain tubes or clay bushings where the wires penetrated the casement. In the unfloored space between the casement and the point at which it passed under the floor, there were 2 or 3 feet of slack in the wire. Such wire as was visible was in a damaged condition, frayed, and the insulation was loose upon it. It was not held tight at the point of entrance. It was an old wire and had been in that condition from the time it was put there. There were porcelain insulators on the eaves of the house from which the wires ran into the window and similar insulators along the garret joists, on the inside. There was no fuse box at the window.

At the time of the fire there was no electric light burning in the house, it having "popped off" a short time before. A severe electrical storm was raging during which there was a peculiarly bright flash of lightning, followed by a heavy clap of thunder. The fire was observed coming from the roof of the house a short time thereafter. Plaintiff's theory was that the rain blown in at the auger holes of the window casement had wetted the woodwork and wires, creating a "short circuit" and setting fire to the woodwork. Plaintiff recovered and defendant appealed.

The court held the essential error in the case to be the submission to the jury of any question as to the defendant's liability for the failure to insulate these wires against electricity, having its origin in the clouds or atmosphere. Where a person proceeding in a lawful business exercises reasonable care, the law does not make him an insurer against the negligence of his actions, which reasonable care and foresight could not have prevented.

The law justly ascribes such consequences to inevitable misfortune or to the "act of God," and leaves the harm resulting from them to be borne by him upon whom it falls. Defendant's duty did not extend so far as to require the insulation of those wires in a manner to protect against injurious consequences of a lightning stroke, for the evidence showed that it was not practicable to insulate them against lightning.

If the wires were sufficiently installed and insulated for the purpose of carrying lighting into the plaintiff's house the court said it felt that in submitting to the consideration of the jury any question of negligence based upon the defendant's failure to insulate against a foreign current of electricity the trial court was inviting them into the realm of speculation in which conjecture, and not evidence, must guide them. The judgment obtained by the plaintiff was reversed.

Phoenix Light and Fuel Co. vs. Bennett (Ariz.) 63 L. R. A. 219.

TELEPHONE COMPANIES AND RAILROAD COMMISSION.

THE Louisiana Railroad Commission at its August meeting gave considerable attention to telephone companies with the following result:

A hearing having been accorded the Cumberland Telephone and Telegraph Company of Louisiana upon the question as to the length of time subscribers shall be compelled to contract for telephones, and after due investigation, the commission being of the opinion that the present rule allowing the said company to require telephones to be taken for a period of one year, or when taken for a less time, to charge the subscribers with the cost of installation, is unjust and unreasonable, it was ordered that order No. 315, entered Nov. 4, 1903, and published in the official journal of the commission at Baton Rouge, La., Nov. 6, 1903, be and is hereby canceled.

It was further ordered that telephone companies shall hereafter be allowed to make contracts with new subscribers desiring telephone service, to keep the telephones for a period of six months from date of beginning of service, at rates authorized by the commission for the class of service desired. If any party desires telephone service for a less period of time than six months, it shall be furnished at the rates authorized by the commission for the class of service desired, provided, the party desiring service pays the actual cost of installation.

A complaint was filed with the commission on July 25, 1904, signed by several residents of the parish of West Feliciana, alleging that they had enjoyed telephone service as subscribers to the Cumberland Telephone and Telegraph Company at rates made by the said company; but that on or about the first of February, 1904, the rates they were paying were raised. It is hereby ordered that the Cumberland Telephone and Telegraph Company shall not demand, receive, charge, or collect from any of the signers of the petition in this case, or from any others not signers thereof, similarly situated, who have enjoyed telephone service at certain rates established.

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IN THE OPERATING FIELD.

KANSAS CITY COMPANY BUYS LONG-DISTANCE LINES.

REPRESENTATIVES of the Kansas City Home Telephone Company and the Western Independent Telephone Company held a meeting recently to finish the negotiations whereby the long-distance lines of the last named company are to be taken over by the Home Company. Those in the meeting were: E. L. Barber, Wauseon, O.; James S. Brailey, Jr., Toledo, O.; Lee Benoist, St. Louis; Arnold Kalman, St. Paul, Minn.; J. J. Heim, O. C. Snider and Hugh C. Ward, Kansas City.

Mr. Ward, as counsel for the Kansas City Home Telephone Company, said:

"We are closing up a deal in which the Home Company obtains the Independent lines. We are also considering to-day the idea of building and extending our lines from Ottawa, Kas., throughout the gas and oil fields of Kansas and the Indian territory. This is practically decided upon. The telephone business is prosperous. Our company has gained 600 subscribers a month since May 1st last and the long distance calls are increasing in a like ratio."

STROMBERG-CARLSON COMPANY MOVES FACTORY.

THE Stromberg-Carlson Telephone Manufacturing Company, which has heretofore had its headquarters in Chicago, is at the present time engaged in transferring its plant to Rochester, N. Y. This company has erected a magnificent factory and when it is in working order it will be able to turn out twice the amount of finished products as was possible previous to this time. All the latest and most approved ideas in factory design have been employed, and the latest types of labor-saving machinery installed. The entire management of the company will be located in Rochester, N. Y., after November 1, including the sales department, which will be in charge of Mr. Charles W. Steger, formerly of the Chicago office. The Chicago sales office, at 70 West Jackson boulevard, will be under the direct supervision of Mr. J. P. Cracraft, and it is the intention of the company to keep a show room, in which will be displayed every kind of apparatus manufactured by the company.

TELEPHONES IN CHURCH.

OFFICIALS of the Congregational church of Sherburne, N. Y., have sanctioned the installation in the pews of a telephone system by which they hope to have the people of the congregation who are hard of hearing enjoy the sermons as well as the rest.

Fred I. Shepard, general manager of the local telephone company, is perfecting the system, connecting each of the pews with a line running directly to the pulpit. A specially constructed transmitter will be placed near the preacher's head so that his remarks will be received and transmitted by it.

LONG-DISTANCE DEVELOPMENT IN SOUTHERN CALIFORNIA.

DEVELOPMENT of long-distance lines on the Pacific Coast is being rapidly pushed forward. New toll lines are being added constantly where the former lines were thought ample at time of construction. All the important towns in Southern California have Independent long-distance connections, and the system is being extended to reach every point. The United States Long Distance Telephone and Telegraph Company is constructing new exchanges in the following cities: Ocean Park, Santa Monica, Westminster, Smeltzer, Huntington Beach, Glendale, Burbank, Tropico, Oxnard, Ventura, Riverside, Colton, Carpenteria, San Pedro, San Diego, Redondo and five branches in Los Angeles.

Besides these exchanges ten others are increasing their capacity to meet the increased demand for long-distance service. Additional toll lines are being built to Compton, Santa Ana, Pasadena, Redlands, San Bernardino, Monrovia and way points, and new toll lines are being constructed to Redlands and way points, and to Smeltzer, Westminster, Huntington Beach, Riverside, Newport Beach and intermediate points from Los Angeles.

JOHN M. HUMISTON JOINS FIRM OF McMEEN & MILLER.

THE firm of McMeen & Miller has recently acquired the services of John M. Humiston, who is an expert in problems of electrolysis. Mr. Humiston has been connected with the engineering department of the Chicago Telephone Company for the past eight years, being engaged upon engineering and construction work. Educated at Lake Forest University, Lake Forest, Ill., and the Armour Institute, he completed his college training in 1896, and entered the employ of the Chicago Telephone Company in that year, and through quick application at once climbed to an important position in that company's service.

In connection with the protection of pipes against damage by electrolysis Mr. Humiston has been for some time consulting electrical engineer to the Shreeveport (La.) Gas and Electric Company, the Ottumwa (Ia.) Gas Light, Heat and Power Company and to six or seven other companies in Indiana, Illinois and Wisconsin, having to meet similar problems.

Mr. Humiston is an associate member of the American Institute of Electrical Engineers. His Chicago address will be that of the firm of McMeen & Miller, 1442-1443 Monadnock Block, and he will be in charge of the firm's branch office, to be maintained for some months in the future at Quincy, Ill., during the progress of the engineering construction of the new Independent telephone system of that city.

RECEIVER FOR NORTH DAKOTA COMPANY.

C. E. BURGESS, a stockholder of the North Dakota Telephone Company at Grand Forks, N. D., seeks to have the affairs of the corporation wound up, and a receiver appointed on the ground that the telephone line has been converted into a telegraph line almost entirely to the exclusion of the telephone business. Edwards, Wood & Company are said to own the majority of stock by recent purchases.

S. H. COUCH CO. INCORPORATES.

THE well-known firm of S. H. Couch Co. has recently been incorporated, and will be known hereafter as the S. H. Couch Co., Inc. The prominent telephone specialist of Boston, S. H. Couch, is president and William Couch is secretary. The same high standard of excellence which this firm has adhered to in the past will continue in the future.

THE BELL GIVES FREE SERVICE?

THE telephone users of Sodus, N. Y., are greatly incensed over a recent manouver of the Bell in this territory. For a number of years the merchants of this town had made overtures to the company to secure an exchange with service at from $15 to $18 per year without success. When the Wayne

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Monroe Company began to solicit for contracts it immediately sent an agent with an offer to install an exchange and give three months' service free. The solicitors secured about sixty contracts, with the provision of free service, which was to extend from July 1 to October 1.

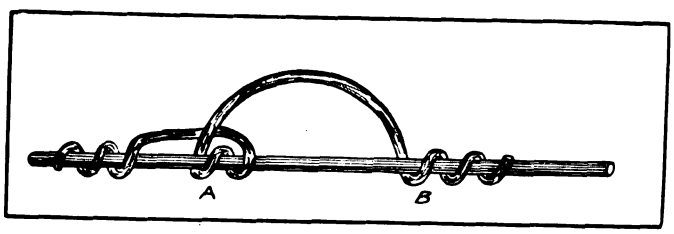
Recently all the subscribers to the system received bills for the three months which were supposedly free, and this has caused a great deal of indignation. The Wayne Monroe Company has secured 150 subscribers, and is in a position to give long-distance service over the lines of the Inter-Ocean Company and the Rochester Home Telephone Company .

ROME, N. Y., A PROGRESSIVE TELEPHONE TOWN.

ABOUT the first of next month a new telephone directory will be issued by the Rome, N. Y., Home Telephone Company. It will be a combination directory and will contain the names of Rome, Utica and Herkimer subscribers; also the subscribers from other exchanges in the Mohawk valley. Rome is one of the best telephoned cities in the United States, there being 1,040 telephones. The exchange was opened October 1, 1900, provision at that time being made for only 500 telephones. The company is extending the cable system to make provision for the many new subscribers who are now on the waiting list.

NEW METHOD OF TYING LINE WIRES.

MR. CHARLES CLAYDON, Tabor, Texas, sends us the following wrinkle in open wire line construction which may be of use, so we illustrate the same for the benefit of our readers. Mr. Claydon's device consists in an improved method of tying the line wire to the insulator, which is shown



in the accompanying illustration. The particular feature consists in turning the tie wire back over the loop formed around the insulator after three turns have been made around the wire and then securing it with three additional turns outside of the first lashing.

THE NATIONAL TELEPHONE COMPANY ADMITTED TO INDIANA.

THE National Telephone and Telegraph Company, of West Virginia, has been admitted to Indiana, and the company has filed a certificate of incorporation and a declaration to invest $175,000 in the building, equipping and operating telephone exchanges, toll lines, etc. The company also proposes to lease or connect with other telephone plants owned or operated by other individuals or corporations. The company's principal office will be in Fort Wayne, and in charge of Wm. L. Moellering, who has been selected as State agent. The Indiana stockholders are Frank H. Cutshall, Wm. Paul, and George T. Cox, of Fort Wayne.

RECEIVER FOR UNITED ELECTRIC COMPANY.

THE Chicago Title & Trust Company has filed a bill in the Circuit Court asking for an injunction against the United Telegraph, Telephone & Electric Company, which stirred the council and the city of Chicago, a year ago by applying for a telephone franchise for the whole city and forcing a most favorable ordinance through the committee on gas, oil and electric light. The trust company asked for an injunction, an accounting, and the appointment of a receiver for the telephone company. It is set forth that the interest on the corporation's bonds has become overdue. The United Company has a long-term telephone grant in the town of Hyde Park, and has for years operated a small exchange in that section of the city. Eighteen months ago the corporation, which was then little known, was re-enforced by new capital and appeared on the council horizon as a competitor to the Chicago Telephone Company.

First, the concern got permission to run a ten-wire cable through the city's conduits from Hyde Park to the center of the city and connect with ten buildings in the downtown district. Next, the corporation came in with a petition for a franchise for the whole city. The ordinance was carried through the committee on gas, oil and electric light after several stormy sessions. A measured service schedule, which would have permitted of higher rates than the Chicago Telephone Company, was a part of the ordinance. So strong a protest was voiced against the action of the committee in recommending the ordinance that its backers gave up the fight, and made no attempt to get the ordinance through the council.

The bonds on which the interest is now alleged to be in default were floated at about the time the application for a franchise was made to the council. The capitalization of the company is $500,000. The outstanding bonds total $174,000. The bonds were secured by a trust deed now held by the Chicago Title & Trust Company. The Trust Company petitions for foreclosure proceedings if the telephone corporation is found unable to meet the obligation.

MR. SAPP JOINS THE CONTROLLER COMPANY.

MR. FRANK F. SAPP has just assumed entire charge of the Promotion and Publicity Department of the Controller Company of America, with general offices at 1061 Monadnock Block, Chicago, Ill. Having for a number of years been general sales manager in charge of the sales and advertising departments of the North Electric Company, of Cleveland, Mr. Sapp is known far and wide in the telephone industry. The change came about through his desire to be more actively identified with the measured-service movement. He has carefully fitted himself for taking hold of this work, and his many friends believe that he will be just as successful in his new capacity as he was with the North Electric Company. He leaves the latter concern with their best wishes. While with the North Electric Company Mr. Sapp acquired the reputation of being one of the most successful sales managers and also one of the most original advertising managers connected with the telephone manufacturing and supply business. He thoroughly organized the selling branch of that concern and it is known that his energy and diplomacy increased the company's business largely. It was, however, in the preparation of pulling advertising copy and attractive catalogues and literature that Mr. Sapp particularly excelled. His copy attracted wide attention on account of its originality and strength, and the North catalogues produced under his direction are considered models of refined and tasteful advertising literature.

BRITISH SUB-MARINE SIGNALING.

BRITISH naval authorities are awaiting with interest the results of a series of experiments that are being conducted with a view to establishing a system of sub-marine signaling. The theory involved is based upon the conductivity of water of waves of vibration. Granted this being correct, if the hull of a submarine is sharply tapped the noise is communicated through the water to a special type of receiver, which makes the noises audible. The present experiments are to determine the distances through which these signals can be transmitted. The difficulty so far encountered is best expressed in the words of one of the officers in charge of the work:

"You must be entirely submerged so as to lose no proportion of the sounds through diffusion into the atmosphere," he said. "The conductivity of water is remarkable. One of the best examples lies in the exaggeration of concussion below the surface.

"It is well recognized that had the unfortunate Al been on the surface, in buoyant trim, when the Castle liner struck her at no greater speed than nine knots, her occupants would have been little the worse for the shock. As it is, there can be no doubt from the postures in which the crew were found that they were stunned to death."

It is therefore evident that a limitation is placed upon the use of severe concussions for long distance signaling.

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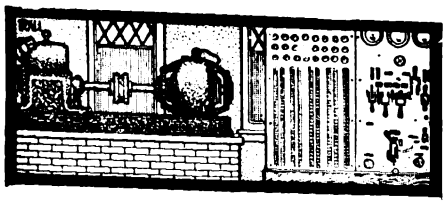
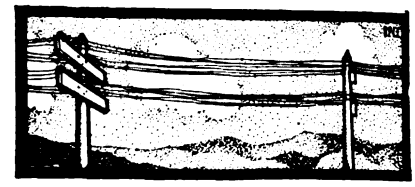


QUERIES

Questions on any subject relating to telephony will be answered on this page.



OHMMETER QUERIES.—(444.)

Please answer the following questions through your query column:

1—Does it make a difference what size wire is used for the ratio arm of the ohmmeter you described previously in your magazine?

2—You make the statement that No. 18 resistance wire averages about an ohm per foot. What kind is it, and where can it be obtained? Persons of authority claim six feet is needed per ohm.

3—In your article on the ohmmeter you divide your scale into 500. I have 900 to mine and ten feet long. How high can you go on the scale and get correct results? Can you go to the highest division? If so, how will I determine resistance with my scale? For instance, your formula is subtract balance point from total divisions, and multiply by coil in circuit. If galvanometer balances at highest division on your scale with one ohm coil it would be 500 ohms, and with mine 960. J. T.

1—The size of the wire used for the resistance wire in the ohmmeter is not a matter of great importance. If the wire is too small it may break and require replacement, whereas if it is too large, the resistance per unit of length is likely to be so low that it is

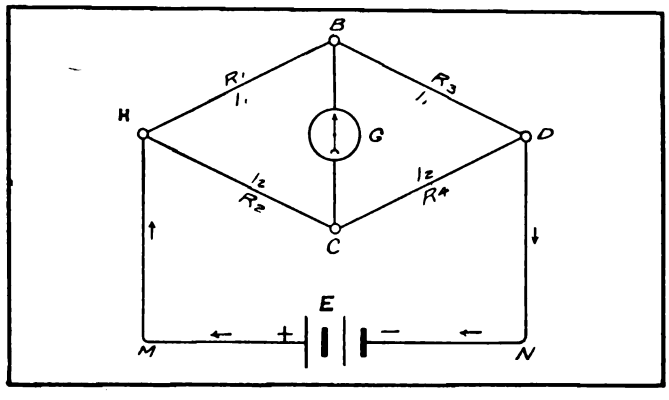


Fig. 444a.

necessary to move the contact point over a long stretch of wire in order to make any sensible difference in the ratio of the segments into which the wire is divided by the contact.

2—A great many different kinds of resistance wire are made, and it is possible for you to obtain No. 18 wire that shall average more or less than an ohm per foot, as you desire. The kind of wire which was suggested in our article is called Manganin wire, and can be obtained from Foote, Pierson & Co., 82-84 Fulton street, New York City.

3—Your third question can be best answered by a consideration of the theory of the Wheatstone bridge, which is as follows: Suppose in Fig. 444a that the points *H* and *D* are joined by six conductors, namely, the conductors *H B* and *B D*, the conductors *H C* and *C D* and the conductors *H M E* and *E N D*. Suppose the battery *E* to be placed in the conductor *H M E N D*, the current will then tend to flow in the direction *E M H*, and at the point *H* it will divide into two parts, one portion flowing through *H B D* and the other through *H C D*.

By using large wire no serious error will be introduced by assuming that the conductor *H M E N D* has no resistance and that the full electromotive force of the battery *E* is applied to the points *H* and *D*. Then between the points *H* and *D* there will be the same fall of the potential *E* along the two paths *H B D* and *H C D*, and, therefore, for *every point* on the path *H B D* there can be found some point on the path *H C D* which is at exactly the same potential. Suppose *B* and *C* be in two such points so that the fall of potential from *H* to *B* is the same as the fall of potential from *H* to *C*, and that the drop from *B* to *D* is the same as the drop from *C* to *D*.

In the first place consider what happens when the points *D* and *C* are not connected. A certain current *I*, will flow between *H* and *D*, and evidently this current will be the same in the portion *H B* as it is in the portion *B D*. Some other current will flow through the path *H C* and *C D* and may be designated as I_2, and it is evident that the current I_2 in *H C* will be the same as the current in *C D*.

Now if the points *B* and *C* be at the same potential and if they be joined by a conductor *B C*, no current will flow through this conductor because there is no difference of potential between *B* and *C*, and consequently joining these points by a conductor will not change the current relations in either of the conductors *H B*, *B D*, *H C* and *C D*. The fall of potential in the circuit is equal to the product of the current and the resistance. Hence, if the resistance *H B* is R_1 and the current I_1, the drop is $R_1 I_1$. Similarly in *H C* if the resistance be R_2 and the current I_2 the drop is $R_2 I_2$. It has been assumed that the drop between *H B* is the same as the drop between *H C*, hence $R_1 I_1 = R_2 I_2$.

Also for the conductors *B D* and *C D* a similar equation may be written; that is to say,

$$R_3 I_1 = R_4 I_2$$

Divide one of these equations by the other, obtaining:

$$\frac{R_1 I_1}{R_3 I_1} = \frac{R_2 I_2}{R_4 I_2}$$

On each side of the equations cancel out the *I*'s, leaving:

$$\frac{R_1}{R_3} = \frac{R_2}{R_4}$$

This may be written in the form of a proportion:

$$R_1 : R_2 :: R_3 : R_4$$

Hence $R_2 = \frac{R_3}{R_1} R_4$

From this last equation it is evident that if there is an unknown resistance R_2 in one arm of the bridge, a known resistance R_4 in the adjacent arm, while the ratio of the other two arms is known, the value of the unknown resistance can be obtained as the product of the ratio of two of the arms multiplied by the remaining arm.

Fig. 444b is the diagram of the circuit of the ohmmeter in which R_2 represents the arm into which the resistance to be measured

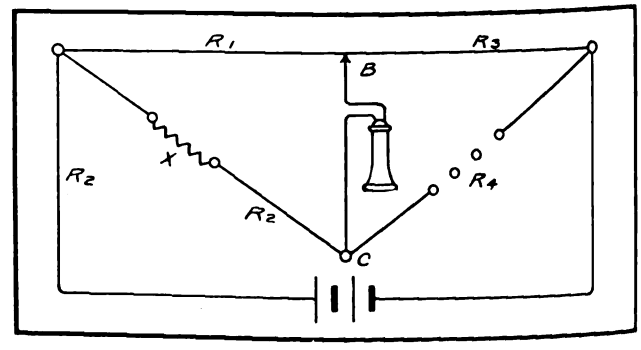


Fig. 444b.

is introduced. R_4 is the arm containing the adjustable resistance coils, while R_1 and R_3 are respectively the segments into which the contact point *B*, connected to the telephone, divides the resistance wire. Inasmuch as the wire is in uniform size and uniform composition, it has uniform resistance per unit of length, and consequently the resistance will be proportionate to the length of each segment, and therefore the ratio of the resistance will be the same as the ratio of the lengths, and so it is unnecessary to

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know the actual resistance, and therefore wire of any resistance, provided it is uniform, will serve the purpose.

The accuracy with which measurements can be made with the ohmmeter depends upon three things: First, the accuracy with which the coils used in the arm R_4 are adjusted. If the resistance of these coils is known within 1, 2 or 4%, the measurement of the unknown resistance will be within the same limits, 1, 2 or 4%.

Second, the accuracy depends upon finding with contact B the point along the wire which is at the same potential as the point C, If a telephone is used as a detector, accuracy will depend upon the sensitiveness of the telephone, the acuteness of hearing of the observer, and the care with which the contact point B is adjusted.

Third, accuracy depends upon the exactness with which the two segments R_1 R_3 are measured. For example, if the wire were one inch long, it might be possible to adjust the contact point within a 100th of an inch, and consequently the accuracy would be limited to 100th of an inch, or 1% of the length of the wire; but if the wire were 100 feet long, the contact point could be adjusted with exactly the same accuracy, namely, to 100th of an inch, and therefore the accuracy would be within, approximately, about 100th of 1%. Therefore, in a general way, the longer the wire the greater is the probable accuracy to be expected.

USE OF REPEATING COILS.—(445.)

What are the principle uses of repeating coils? N. A.

Repeating coils, as their name indicates, are used for repeating from one circuit to another. Their principal uses are to join subscribers' instruments to long toll lines, and to join magneto systems to common battery.

THE NEED OF A TRAFFIC ASSOCIATION

By H. E. Bradley.

THE time will soon come if, indeed, it has not already arrived, when the proper handling and accounting for long-distance messages will become a vital question to all Independent companies.

In speaking of long-distance, I refer only to messages of one hundred miles and upwards, and messages which pass over the lines of more than two separate companies.

There are many Independent companies who are at the present time operating lines more than one hundred miles in length, and giving good service. There are many cases where separate companies are interchanging business. But trouble generally comes when messages are originated in the territory of one company, pass over the lines of one or more intervening companies, and terminate in the territory of a third or fourth company.

These troubles may arise from any one of a number of different causes, but up to the present time there is too much of a tendency to lay it to the other fellow, and until the time comes when the companies are more willing to get together, toll business must suffer.

As soon as the toll lines have reached out until a connection has been established with an adjoining company, the toll service has reached the dignity of long distance.

Messages originating in the territory of one company, and terminating in the territory of the connecting company are easily cared for with little trouble, as such business is covered by a single agreement, but one division of the toll is necessary, and settlements are easily arranged.

Now come the messages which are originated by one company, pass over the lines of two or more intervening companies, and finally terminate in the territory of a fourth or fifth company.

With these connections also come the troubles of settlements. If there are five separate companies, there are five separate settlements, and five separate bunches of trouble, for there are sure to be differences in each report.

How is this business to be cared for in the shortest time, and with the least trouble? The usual reply is, let each company settle with its connecting company. This sounds well, and looks easy, but those who have had experience know it to be troublesome and expensive, and slow. The company who collects the tolls will get its share, the through company will get all it can, and the company who terminates the message gets whatever is left. If it is the proper amount, well and good; if it is not, it's difficult to prove who has taken an undue proportion. Then begin the troubles of readjustment, which often cover two to three months, during which new settlements are coming in, and the usual outcome is a general decision by all companies to "keep what you've got and let it go at that."

How are these settlements to be made with fairness to all, in the shortest time, and at least expense?

Many of the Independent companies have found the answer in the traffic association, an organization which has an equal interest in all its members, large or small, and yet is partial to none.

The object is to promote interchange of business, to publish necessary rates and routing directions, and to facilitate settlements.

Instead of making five separate reports each company makes but one, and that to the association. The association checks and settles all differences and divides equally, fairly and impartially all tolls. It acts as a court of arbitration where all disputes and misunderstandings can be adjusted, and extends to all its members the same benefits.

One of the greatest to be derived is the publishing of rates and routings in book form, showing the proper toll charges, and the different routes over which the messages may be carried, together with a complete list of checking and other line points.

This work if done by the individual company would become a large item of expense, but by centralizing the work and the association, and combining all under one cover, a most valuable book is obtained at a minimum of cost.

Independent long-distance service is still in its infancy, but it is growing, and growing rapidly, and if the Independent companies and associations will only work together, for the common good of all, forgetting past disputes and petty disagreements, there is no reason why the success so much desired should not crown our efforts.

Editor's Note.—Extract from an address made before Penna. State Ind. Tel. Assn. Convention.

A NEW APPLICATION OF TELEPHONY.

A COMPANY has been promoted in Spokane, Wash., to furnish musical programmes to subscribers by means of the telephone. This company, known as the Pacific Telharmonic Company, with headquarters at Seattle, is reported to have secured the exclusive rights west of the Rocky Mountains, of a device invented by Thaddeus Cahill, of Holyoke, Mass. A special transmitting devise has been perfected which enables a musical number to be simultaneously distributed over any number of circuits.

By means of this invention, it is claimed, a single central station at San Francisco could, if thought desirable, distribute music to nearly 600,000 people; one at Los Angeles, to about 300,000; one at Denver, to nearly 500,000; one at Portland, to 200,000; one at Seattle, to 250,000; one at Spokane, to 100,000, and so on.

The officers of the company are: C. J. Smith, president; John H. McGraw, vice-president; J. W. Clise, treasurer; F. A. Wing, secretary; T. O. Abbott, counsel and general manager. A. S. Kerry and Robert T. Reid, together with the foregoing persons, constitute the board of trustees.

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THE WEEK'S MESSAGES

FINANCIAL.

RUSHVILLE, IND.—The annual meeting of the stockholders of the Rushville Co-operative Telephone Company was held Friday night. The annual report of the secretary showed the receipts for the year to be $15,404.91. The disbursements were $14,664.78, leaving a balance of $440.13. H. E. Barrett, W. D. Root, Ben L. McFarlan and T. M. Green were elected directors.

ST. JOSEPH, MO.—The Clarksdale Telephone Co. has increased its capital stock from $2,500 to $5,000, and will put in additions to the plant.

WILLOUGHBY, OHIO.—The Kirtland Telephone Company has increased its capital stock from $2,500 to $5,000.

WYTHEVILLE, VA.—At the meeting of the Wythe Mutual Telephone Company it has amended its charter so as to issue $3,000 worth of preferred stock.

FRANCHISES.

HAZEN, ARK.—The city council has granted a franchise to the Hazen Electric Light & Telephone Company.

ESTHERVILLE, IOWA.—The Emmet County Telephone Company seeks a local franchise for a new exchange.

SHELDON, IOWA.—The Commercial Club has asked its president, G. A. Starrett, to ask the city council for a franchise for the construction of an Independent telephone system.

ONEIDA, N. Y.—The business men of this city are interested in having a local office of the Home Telephone Company installed here.

WEST HOPE, N. D.—The West Hope Telephone Company, represented by Messrs. Lilly, Rinkel, Neville and Frank Collins, appeared before the city council recently and applied for a franchise which was granted. This company has just been organized with about $2,500 worth of stock subscribed. It is contemplated to construct a local exchange and also do an extensive rural line business.

CYGNET, OHIO.—The town council has granted a franchise to the Oil Belt Telephone Company to install a new system of telephones in this city.

MIDDLETOWN, OHIO.—At the meeting of the city council the question of a franchise for the Home Telephone Company will be considered.

MUSKOGEE, IND. TER.—A new telephone system is asking for a franchise in this town.

LOWER MERION, PA.—The Keystone Telephone Company has applied for a franchise to operate a system in this village.

MORRISTOWN, TENN.—The Citizens' Telephone Company has applied to the city council for a franchise.

EVERETT, WASHINGTON.—An application for a franchise by the Skagit Farmers' Mutual Telephone Company was given its first reading before the city council recently. The new company wants a fifty-vear term. It has lines now operating in Skagit and Snohomish counties.

ELECTIONS.

BLANCHARD, IOWA.—The annual election of the stockholders of the Mutual Telephone Company was held recently and resulted in the election of the following directors: W. N. Dewhart, R. A. Salee, Edward Hensleigh and G. H. Whitmore. The directors will meet in the near future and elect another director, who will act as secretary and manager, and also a president and treasurer.

OSWEGO, N. Y.—The Oswego Telephone Company has elected the following officers: Dr. W. A. Moulton, president; Thomas Dean, vice-president; B. R. Whitcomb, secretary; W. H. Clark, treasurer. B. H. Sutfin and G. H. Horton, trustees.

NEW COMPANY NOTES.

SELMA, ALA.—The Maplesville & Selma Telephone Company has been organized at Selma with a capital stock of $4,000.

COLORADO CITY, COLO.—The El Paso Telephone Company has been incorporated with a capital stock of $500,000 by M. H. Spere, N. B. Hames, and C. D. Taylor. The company will extend its lines through the counties of El Paso, Teller, Fremont, Pueblo, Douglas and the city and county of Denver. The principal office will be in Colorado City.

WASHINGTON, D. C.—The National Telephone & Electric Company has been incorporated with a capital stock of $100,000 by B. F. Wasson, Ernest W. Porter and E. Richard Shipp.

TILDEN, IND.—The Tilden Mutual Telephone Company has been incorporated with a capital stock of $5,000 by M. F. McClung and James W. Ferree.

WEWOKA, IND. TER.—The Oklahoma Southern Telephone Company has been succeeded by the Jennings Telephone Company.

BARNUM, IOWA.—The Barnum Telephone Company has been incorporated with a capital stock of $10,000. It will install a local exchange.

ELDORA, IOWA.—The Eldora, Rough Woods and Point Pleasant Telephone Company has filed articles of incorporation with the secretary of the state. The capital stock is $10,000. E. H. Sheldon and others are the incorporators.

ELLSWORTH, KAN.—The Lyons Telephone Company has been incorporated in this city with a capital stock of $12,000.

ROSEHILL, KAN.—The Derby & Rosehill Telephone Co. has been incorporated, with a capital stock of $630, to construct a rural line between the two points.

THORNBURG, KAN.—The Thornburg Telephone Company has been incorporated with a capital stock of $1,000.

EASTBROOK, ME.—The Eastbrook Telephone Company has been incorporated with a capital stock of $2,000. The officers are: S. S. De Beck, of Franklin, Mass., president; R. B. Laurie, treasurer.

GENESEE, MICH.—The Shiawasse and Genesee Mutual Telephone Company has been incorporated with a capital stock of $10,000.

CERRO GORDO, MINN.—The Farmers' Mutual Telephone Company of Cerro Gordo has been organized with a capital stock of $20,000.

GOODTHUNDER, MINN.—The Farmers' Central Telephone Company has been organized with Charles Perlish, president, and G. A. Weidenheft, secretary.

MORRILL, MINN.—The Morrill Rural Telephone Company has been organized with a capital stock of $5,000.

NEWMARKET, MINN.—The Star Telephone Company has filed articles of incorporation with the secretary of state. Capital stock, $10,000.

STILLWATER, MINN.—The farmers of Stillwater and Grant Townships in this vicinity have organized the Twin Lake Rural Telephone Company.

WALDON, MINN.—A local telephone company has been organized and will build a line to Starbuck.

ZUMBRO FALLS, MINN.—The Zumbro Falls Telephone Company has been organized with a capital stock of $7,000 by Frank Robertson, Bert W. Dunsey and others.

KANSAS CITY, MO.—The Kansas Telephone & Construction Company has been incorporated with a capital stock of $75,000.

BENKELMAN, NEB.—The Dundy County Mutual Telephone Company has been incorporated with a capital stock of $3,000.

MACDOUGALL, N. Y.—The MacDougall Telephone Company has been incorporated with a capital of $5,000. The incorporators are A. Buldridge, R. C. Allen, and A. Buldrige, Jr., all of MacDougall.

PATCHIN, N. Y.—The Boston Valley Telephone Company of Patchin, N. Y., has been incorporated with a capital stock of $2,000 by L. G. R. Whiting and John W. Gasper, of Patchin, and F. A. Wurtz, of Boston, N. Y.

CAMDEN, N. J.—The Folding Cabinet Company has been incorporated to manufacture telephone cabinets. Capital, $10,000. The incorporators are: Charles A. Wolverton, of Bridgeport, and T. E. French, of Camden.

RUSHCREEK, OHIO.—The Rushcreek Telephone Company has been organized with a capital stock of $5,000. W. H. Petty is president; W. Klingler, secretary, and D. T. McCan, treasurer.

MEDFORD, OKLA.—The Medford Rural Telephone Company has been incorporated with a capital stock of $3,000.

UNION, OKLA.—The Union City Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are: F. L. Wilkins, T. M. Kirby and L. S. Fuhring.

NEW CASTLE, PA.—An Independent telephone company is being organized by the Lawrence County farmers.

POTTSVILLE, PA.—The Mahanoy & Mahantonga Telephone Company has been incorporated with a capital stock of $20,000.

LETCHER, S. D.—A number of farmers residing west of here have organized the Storla Telephone Company, and are rapidly completing the work of extending lines through the rural communities. Four lines are being constructed. It is proposed to extend the lines northwest to the town of Lane, and southeast and southwest to the farming communities in those directions.

PARKER, S. D.—The Steininger Telephone Company has been incorporated with headquarters in this city and capital stock $50,000. J. A. Steininger of this city is president and general manager of the company, which is composed entirely of capitalists of this and nearby towns. Exchanges will be installed at Hurley, Marion, Monroe and Dolton. Rural lines will be installed at Hurley, Marion, Monroe and Dolton. Rural lines will be constructed throughout the county and contiguous territory.

TULLAHOMA, TENN.—Business men in this town at a meeting held recently took steps toward the organization of an Independent telephone company. The Cumberland Telephone Company has increased its rates by 100 per cent.

COMBINATIONS.

HARTWELL, GA.—The Hartwell Telephone Company has been purchased by F. P. Linder from L. M. Felton.

MAXWELL, IOWA.—F. G. Ainley has disposed of all his holdings in the Maxwell Telephone Company to James Prawl, the present manager of the company, Dr. L. P. Joor and H. M. Cole. A meeting of the new company was held and the following officers elected: P. Joor, president; H. M. Cole, secretary and manager, and James Prawl.

SYRACUSE, KAN.—The telephone system in this city has been sold by H. H. Jones to Clarence Daigh.

GRAND RAPIDS, MICH.—The Citizens' Telephone Company has secured a controlling interest in the Independent system at Marshall.

REDWING, MINN.—The Consolidated Telephone Company has obtained a controlling interest in the Redwing Telephone Company.

BUTTE, MONT.—Harry W. Turner and Max Hebgen of this city have purchased the Havre Telephone Exchange for $40,000 from Eric V. Haser of St. Paul.

MARLBORO, N. Y.—The Colonial Telephone Co. has secured control of the Local Telephone Company.

LE RAYSVILLE, PA.—Representatives of the East Herrick, Orwell,

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Warren Centre, Neath and Jackson Valley Telephone Companies met in this town recently and merged their lines in a new company to be known as the People's Co-operative Telephone Company, of which following are the officers: D. Cowles, of Orwell, president; B. H. Phelps, of Stephens Corners, secretary; H. G. Newell, of Potterville, corresponding secretary; Rev. Hugh Jones, of Neath, treasurer. A movement is under way to extend the line south toward Stevensville and make connections with the Rush system.

WAYNESBORO, PA.—At a meeting of the subscribers of the local telephone company the project of leasing the United Company's Exchange was discussed.

MISCELLANEOUS.

HARTWELL, GA.—The Hartwell Telephone exchange has been purchased by F. P. Linder from L. M. Felton. Mr. Linder has purchased a large lot of supplies and will greatly improve the exchange.

DETROIT, MICH.—The Co-operative Telephone Co. has established connections with Toledo, where there is an Independent exchange of about 3,000 telephones. Points in Ohio and Indiana are reached through Toledo.

JACKSON, MICH.—J. B. Ware has made a proposition to the regents of the university to install citizens telephones at half the price paid the Bell.

LOWELL, MICH.—The Citizens' Telephone Company will increase both business and residence rates $3 per year. There are now 360 telephones in operation.

DALEVILLE, ILL.—The Daleville telephone system is being rapidly extended. There are now 150 telephones in operation and more lines will be built as soon as possible.

DANVILLE, ILL.—The Vermillion County Telephone Company has recently completed the installation of its new exchange in this city.

QUINCY, ILL.—Samuel G. McMeen, of the firm of McMeen & Miller, has taken charge of the preliminary engineering work for the new automatic exchange at Quincy. Underground conduits will be laid in the business part of the city.

ELWOOD, IND.—The Delaware and Madison Counties telephone system in this city is being rapidly extended. There are 122 local subscribers and 67 on farmers' lines.

AFTON, I. T.—The Afton Telephone Co. has had a change in ownership.

OTTAWA, KAN.—The Independent Telephone Co. expects to have its toll line open between this city and Kansas City, Mo., by Nov. 10. The line will be pushed on south into the oil fields.

PECK, KAN.—The Ninnissah Valley Telephone Company has installed a 100-line capacity rural board. It has over one hundred rural telephones.

SPRINGFIELD, MINN.—The Farmers' & Citizens' Telephone Company is now ready for business.

ZUMBRO FALLS, MINN.—The new Zumbro Falls Farmers' Telephone Co. will connect with the long distance system of the Tri-State Telephone & Telegraph Co.

PERSONAL.

A. E. JEAVONS, formerly of Fort Worth, has been appointed local manager for the Southwestern Telephone Company at Waco, Tex., in place of J. W. Henshaw, who resigned.

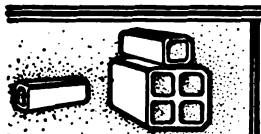
R. P. BERNARD has been appointed manager and secretary of the People's Mutual Telephone Company at Hillsboro, Ill.

UNDERGROUND.

COLUMBIA CITY, IND.—The Farmers' Mutual Telephone Company is making a number of extensions to its plant, which includes a two-cable conduit in the business part of the city.

ROANOKE, VA.—The Virginia & Tennessee Telephone Company will place its wires underground and will also run aerial cable.

RIVERSIDE, CAL.—The Home Telephone Company has commenced building its long distance lines. It has already commenced to install telephones in the city.



New Construction in the Field

CARROLLTON, GA.—The Gainesboro Telephone Company, of this city, is engaged in constructing an additional circuit between this office and Bremen, 12 miles north of here, in Haralson County. Bremen is now reached through Villa Rica. Increased business in adjacent territory to the west and north of Bremen demanded additional facilities.

BLOOMINGTON, ILL.—The Home Telephone Company will commence erecting at an early date new poles to accommodate 30,000 feet of aerial cable in that city.

CLINTON, ILL.—B. F. Wasson, of Clinton, has made a contract with the Interstate Telephone Company for long distance service. The new line will be made with No. 10 copper wire and construction will be of the highest grade.

MUSCOGEE, IND. TER.—The Pioneer Telephone Company has begun work on a new system for this city to cost $50,000 to replace the old system.

DES MOINES, IA.—The Mutual Company is building a new exchange.

HARLAN, IOWA.—The Shelby County Mutual Telephone Company is constructing lines in Harlan.

WEBSTER CITY, IA.—The exchange of the E. H. Martin Telephone Company is being re-built.

MUSKOGEE, IND. TER.—The Pioneer Telephone Company has commenced installing a new flashlight system, and the service will be extended to all parts of the city. A new brick building will be erected, and altogether $60,000 will be paid out by the company in making improvements.

ANTHONY, KAN.—The Southwestern Telephone Company has built a toll line to Duquion, Kansas, to connect with the Kingman Telephone Company.

COATS, KAN.—The Farmers' Mutual Telephone Company has finished its rural system of about fifty telephones.

KIOWA, KAN.—The Kiowa Telephone Company, of which Amas Jones is manager, is building a toll line to the western part of Barber county. This line is being built expressly for the use of the cattlemen.

PRATT, KAN.—The Pratt Telephone Company has completed its toll line to Greensburg, Kansas, a distance of thirt-five miles.

BRIDGETON, ME.—The new farmers' telephone line will be built at once.

ST. JOHN, MICH.—The Grand Ledge Telephone Company will start the construction of its out-of-town lines at once. Among other lines one will be built to Watertown.

DULUTH, MINN.—The Zenith Telephone Company will spend $1,000,000 in improving and enlarging its system.

NEW RICHLAND, MINN.—Henry Jachning will build a telephone line into the country northwest of this village.

NEWPORT, MINN.—The Twin City Telephone Company is putting up its wires through this village.

NEW ULM, MINN.—The Minnesota Central Telephone Company is spending $15,000 on improvements here.

READING, MINN.—The Farmers' Mutual Telephone Company is extending its system.

SILVER LAKE, MINN.—J. J. Greaves, of Glencoe, is installing a new telephone line in this vicinity.

LA GRANGE, MO.—The office of the Lewis County Telephone Company here is being enlarged and improved. The lines are to be gone over and new poles put up where they are needed. This company is growing every day, not only in La Grange, but wherever there is an exchange belonging to the company.

ONEIDA, N. Y.—The New Canastota Telephone Company expects to begin the establishing of its system in that village.

ELIZABETH CITY, N. C.—The telephone line to Weeksville has been constructed.

DEVIL'S LAKE, N. D.—President A. B. Kirlin, of the Devil's Lake Improvement Company, has received a contract from the Indian department of the Interior to construct a telephone line to this city and Ft. Totten.

GRAND FORK, N. D.—The new telephone line to Walcott is nearly completed.

LEONARD, N. D.—The Leonard Rural Telephone Company is constructing several new lines.

CIRCLEVILLE, OHIO.—S. H. Simon will build a local line, which will run to Clearport and adjacent territory.

GALLITZIN, PA.—The Cambria County Telephone Company contemplates installing an exchange in this city.

WORCESTER, PA.—The Montgomery Telephone Company is making a number of extensions to its system and will build lines to Norritonville. This company operates in the heart of a populous farming country, and has progressed to a great extent during the last six months.

CHAMBERLAIN, S. D.—Frank E. Rowe is building a new telephone line south of town. Branches will be extended to Phelps' Island, Okla., and Red Lake Township.

PIERRE, S. D.—Work has been commenced on a telephone system for the Cheyenne River Indian reservation, lines to be run from the main agency, near Forest City, to Cherry Creek, in the southwest corner of the reservation, and to White Horse Camp, in the northwestern corner.

REVILLO, S. D.—The new telephone system at this place has been completed and placed in operation. The line extends to Albee.

FORT WORTH, TEX.—The Fort Worth Telephone Company has about completed its line to North Fort Worth, with a 200-pair cable, making a total of 250 connections to that point. A fine telephone for the free use of the public will shortly be installed in the Texas and Pacific passenger station.

HARTLAND, VT.—The Hartland Telephone Company will commence its work on a new line to extend into West Windsor.

SHUSHAN, VT.—The Granville Telephone Company has nearly completed its new line between East Salem and Shushan, and will make an extension to West Sand Agate.

BOONE'S MILL, VT.—The Franklin County telephone lines are now constructed to the Roanoke County line, awaiting connection with the Roanoke company.

BOOK NOTICES.

TELEPHONY, Part V.—The Substation; by Arthur Vaughan Abbott. McGraw Publishing Company. 473 pages, 310 illustrations. Price $1.50.

This is the fifth volume of a series which treats the subject of telephony in a masterful manner. In all, there are ten chapters, each devoted to some special feature of the substation. The various parts of the apparatus are thoroughly explained and a chapter is set aside for costs of installation and operation. This is a feature that heretofore has received little attention from writers, and is therefore one which would commend this volume to all in need of some definite information upon this important phase of telephony. An important adjunct to this work is a list of twenty tables, which give detailed information upon almost every feature of substation design and engineering. The illustrations are copious and furnish graphic information of every part of the ap-

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paratus used in the construction, protection and operation of this branch of telephone engineering.

The chapters, with their subjects, are as follows: I, Introduction; II, The Receiver; III, Telephone Transmitter; IV, Induction Coils and Substation Circuits; V, Transmission and Current Supply; VI, Signalling Apparatus; VII, Protection; VIII, Party Lines; IX, Substation Assemblage; X, Cost of Installation and Operation.

To all those interested in the telephone industry we heartily recommend this volume, together with its predecessors, as furnishing a fund of information not to be found in other works of a similar character.

This volume or the entire set can be obtained through the AMERICAN TELEPHONE JOURNAL.

TRADE NOTES.

M. LANZ & SONS, Pittsburg, Pa., are specialists in structural iron work. They have just issued a leaflet, which gives valuable information upon strains and the designs of bolts. This leaflet will be mailed upon request to all parties interested.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY has received an order from the Shinglehouse Telephone Company, Shinglehouse, Pa., for construction material, switchboard and telephones for the new telephone system it is building in that place.

THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Block, Chicago, is distributing a handsome and instructive booklet or bulletin describing its new styles of controller apparatus. The company will be pleased to send this bulletin No. 2 to any one not having received it upon the receipt of address.

THE CONNECTICUT TELEPHONE & ELECTRIC COMPANY has placed upon the market a new device for four-party selection signaling, whereby it is possible for stations to call each other without signaling the exchange. This device can be used on any line, and can be adapted to any instruments now in use. By mailing your address the company will send its new No. 8 catalogue, which contains a fund of information.

THE FRANKEL DISPLAY FIXTURE COMPANY, 718 Broadway, New York, wishes to draw the attention of exchange managers to its test clip. As a time saver in clearing trouble it is without an equal service; it gives instant metallic connection with any insulated conductors without injuring the sheathing. The company will be pleased to send a sample hundred which if not entirely satisfactory can be returned at its expense.

THE AMERICAN ELECTRIC TELEPHONE COMPANY has recently sold an additional section to the switchboard of the Topeka Independent Telephone Company, of Topeka, Kansas. The entire equipment for this exchange has been furnished by the American Electric Telephone Company. Since the original installation in 1901 it has been necessary to enlarge the system once ever nine months and is now giving service to nearly 2,500 subscribers.

MESSRS. MCMEEN & MILLER, 1442-1443 Monadnock Block, Chicago, Ill., have complete charge of the construction of the new Independent telephone system which is being constructed at Quincy, Ill. A branch office will be maintained at Quincy, while the work is in operation, and every preparation has been made to complete the system at as early a date as possible. It is confidently expected that several thousand subscribers will be given service within a few months.

THE BENBOW CO., of Philadelphia, Pa., has placed on the market an adjustable disk bracket, which has a number of points of merit. Besides being useful it is strong and durable and makes a nice appearance. Its cost can be made in one year through the saving of expenses in repairing desk instruments, which have been knocked down. This company has built up a large business in this specialty, and is known throughout the country for its honest dealings. It will be pleased to furnish full particulars of this bracket upon request.

FRANK B. COOK, recognizing the fact that there are a great many small exchanges with 50 or 100 lines in use, which are not willing to put their trust in poor protection, has constructed a special protector and distributing frame for their needs called Type "L 3." This frame can be equipped for only ten lines if desirable, and the capacity can be increased in banks of ten pairs of protectors at any time. The Telluride Power Co., at Provo, Utah, has just placed an order for one of these frames, as has also the Northeastern Telephone Co., of Portland, Maine.

THE MORRIS ELECTRIC COMPANY, 4th and Shipley streets, Wilmington, Delaware, begins advertising in this issue a new and meritorious specialty that will be a boon to all telephone managers and installers. It is a cleat made of hard fibre and has been on the market for a short time only. Already, however, the Morris Company has sold thousands of these cleats to both the Bell companies and several large Independent companies. Many of these companies have sent re-orders, and it is generally conceded that this article although small will have an enormous sale, on account of its utility and many advantages. The various styles in which these cleats are made, solve all problems of inside wiring, save much valuable time, and give a neater completed job than can be obtained by any other form of staple or cleat. In addition to being smaller and neater than either wooden or porcelain cleats, the hard fibre cleat is unbreakable and will not split. It can be installed in about half the usual time. They are made with a single groove for twin or parallel wiring; with two grooves for twisted pairs, three grooves for three wires, and a special end groove for corner wiring. They are furnished in either of three colors, black, gray or black, to harmonize with various styles of woodwork, etc. Every Independent company should write for samples and prices on these cleats, as they are a simple remedy for inside wiring troubles. The Morris Electric Company will be pleased to furnish samples and information on request.

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Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED you to know that I can locate your cable troubles. Charges moderate. Address C. E. NICHOLAS, Columbus, Ohio. 226

WANTED—A first-class business man with administrative capacity to act as general manager of a telephone company operating upwards of 10,000 telephones. One having practical telephone experience, including the operation of toll lines, preferred. State age, experience, and give references. Address Box 266, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 266

WANTED.—Position of responsibility, by practical telephone man, married. Iowa or Missouri preferred. Address GEO. A. BISHTON, Cedar Rapids, Iowa, care Telephone Co. 262

WANTED—Second-hand generators and ringers in good condition; give make, general condition and price asked. Address Box 223, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 223

POSITION wanted by technical man with eight years' experience in combined electric light and telephone work; at present employed; good reason for desiring a change. Address box 256, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 256

WANTED—Position; nine years in the business; married; sober; can get and hold business; at present assistant manager with company having 14 exchanges, about 400 miles of toll line. Would accept position as manager with appreciative company having undeveloped territory which by proper handling and untiring effort could be built up. Address Box 267, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 267

WANTED—A man experienced in long-distance telephone work, and familiar with composite circuits. Address New York, Box 261, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York City. 261

WANTED.—Manager of exchange of 300 common battery and magneto telephones, located in New York State. Good salary at start, and steady increase to right man. Only hustlers who want and can earn good pay need apply. Address Box 259, care THE AMERICAN TELEPHONE JOURNAL, N. Y. 259

AM open, any time between now and March 1, for position as superintendent or manager of exchange. Am, at present, managing a system built by me, but want larger field. Fifteen years' experience in all branches of telephone business. Would accept good position other than above mentioned. Best of references furnished. Address Box 268, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 268

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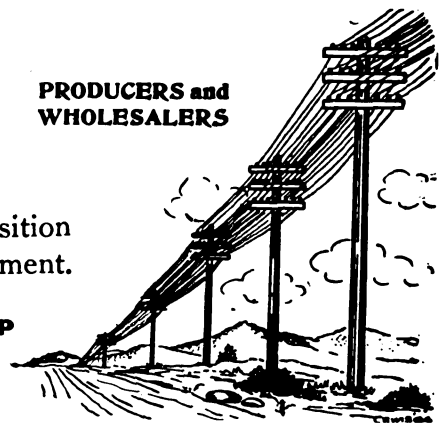

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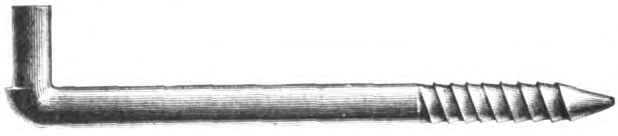

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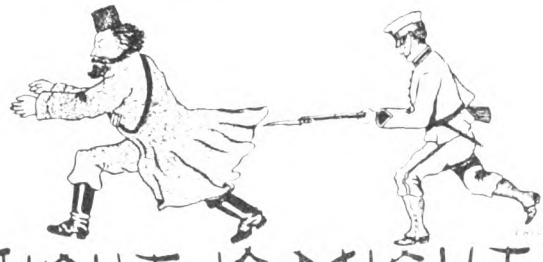

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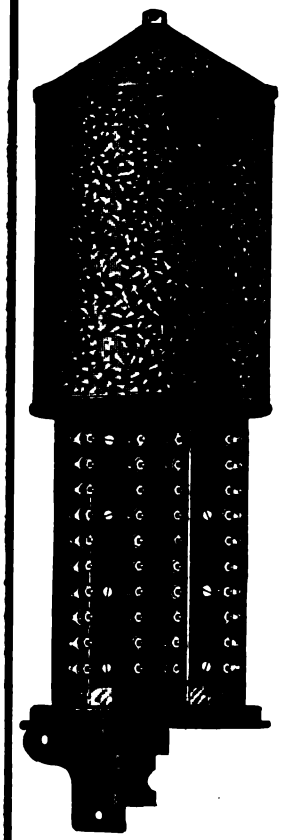

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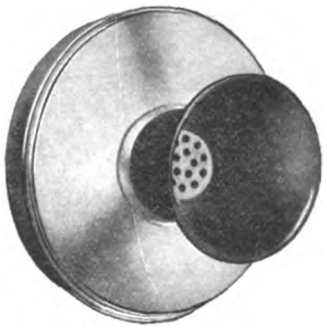

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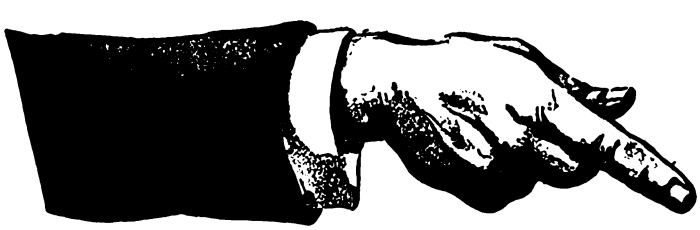

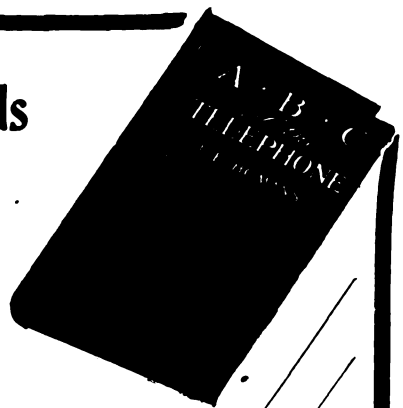

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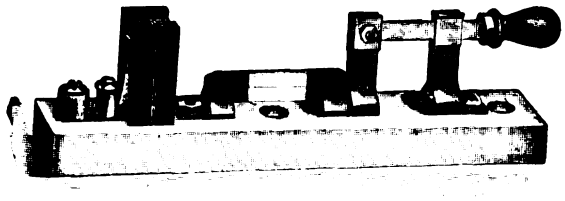

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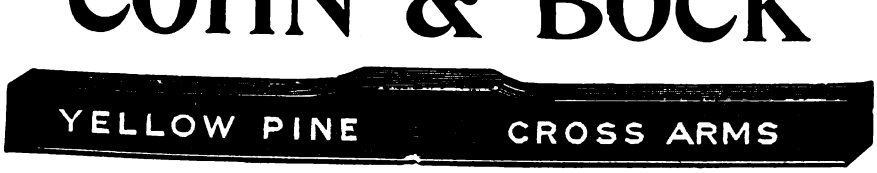

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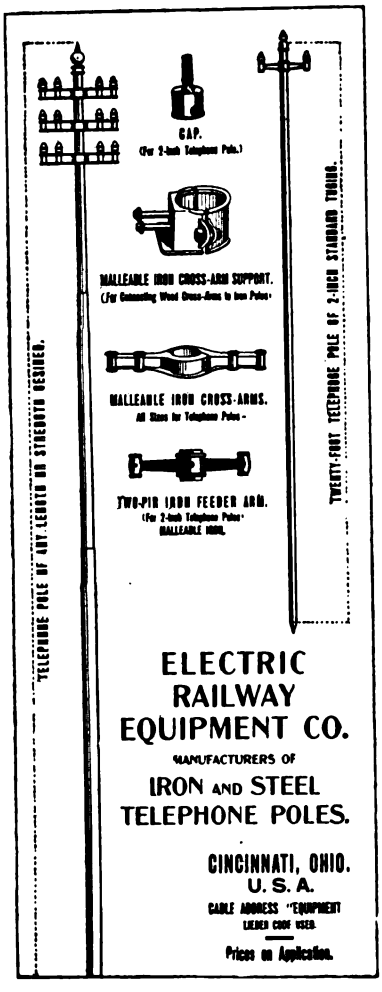

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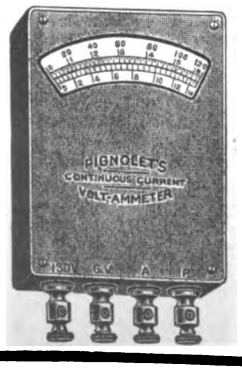

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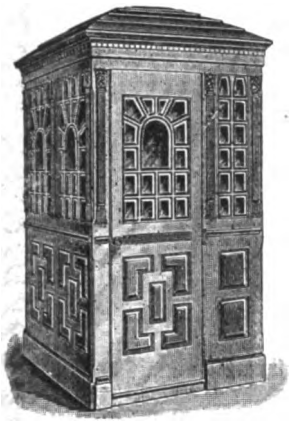

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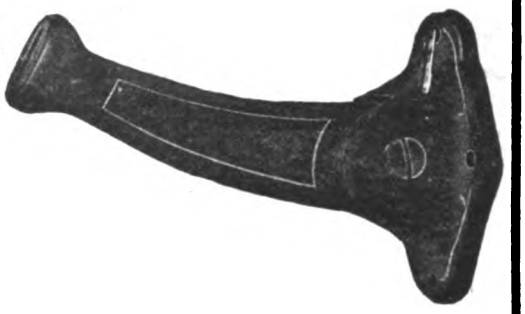

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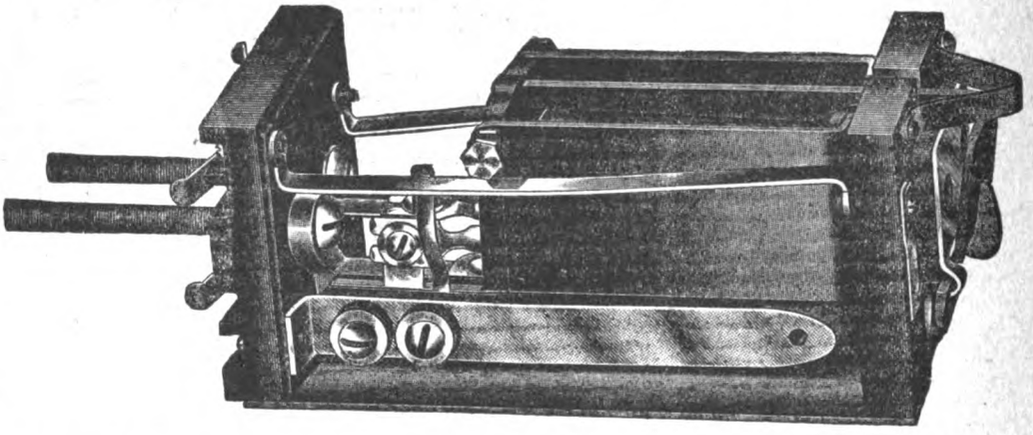

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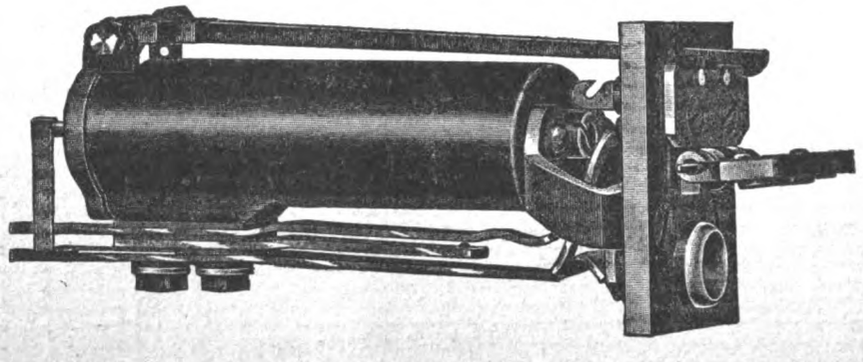

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PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—NOVEMBER 5, 1904—CHICAGO Number 19

PUBLISHED WEEKLY ONE DOLLAR A YEAR

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IMPEDANCE AND RETARDATION..... Article VI. By ARTHUR VAUGHAN ABBOTT
A CABLE RECORD SYSTEM.....By HAROLD A McMAN
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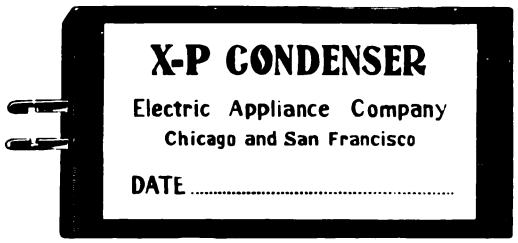

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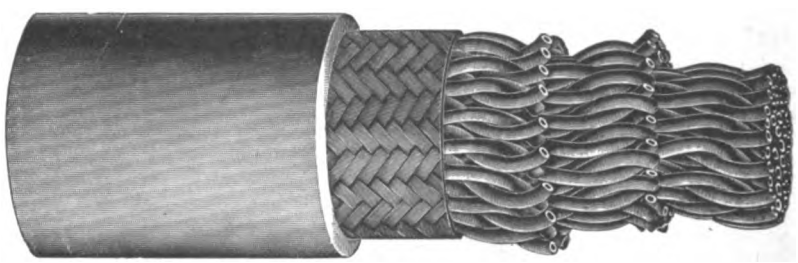

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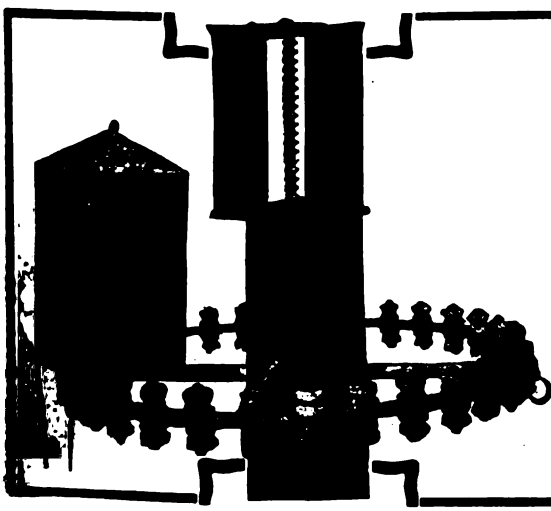

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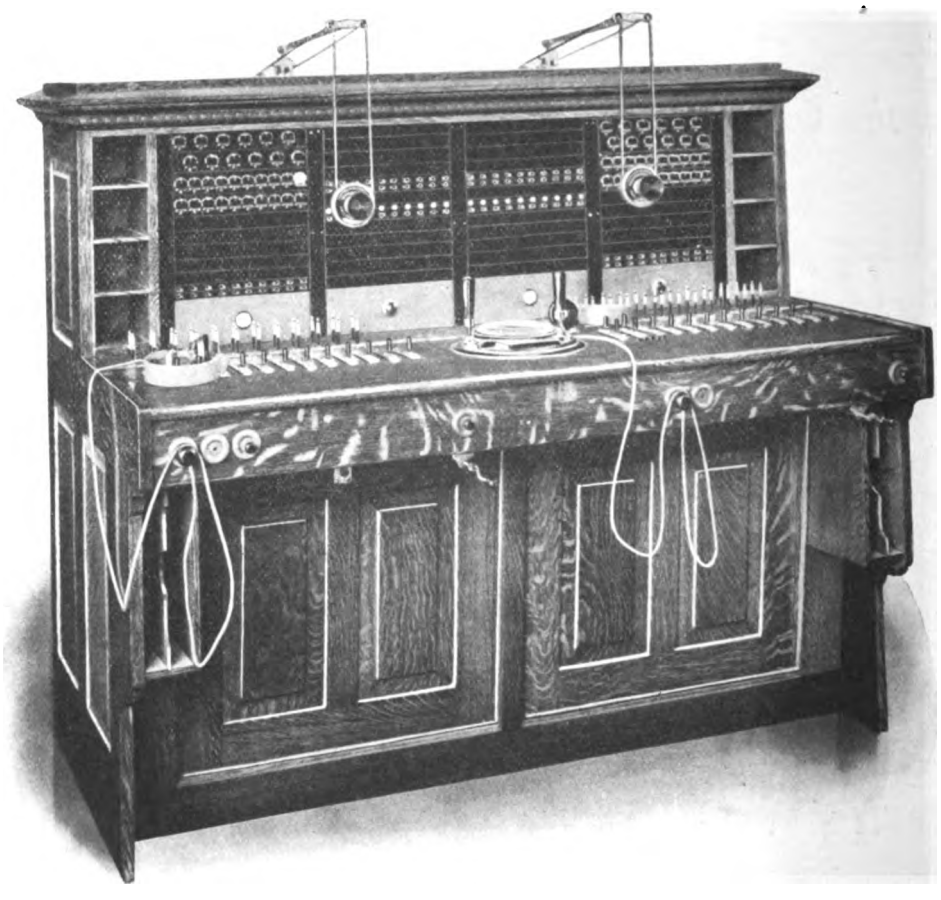

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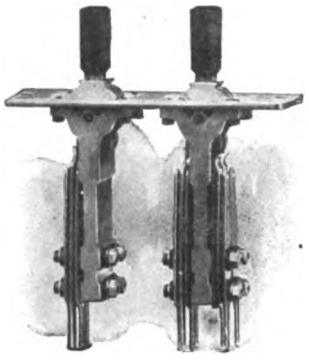

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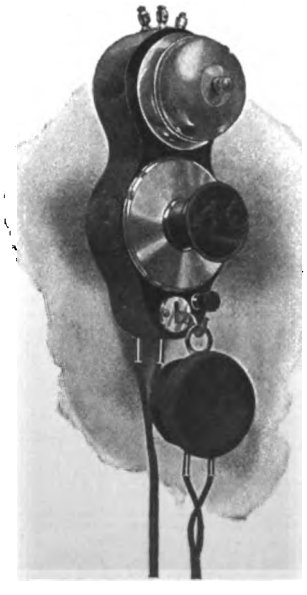

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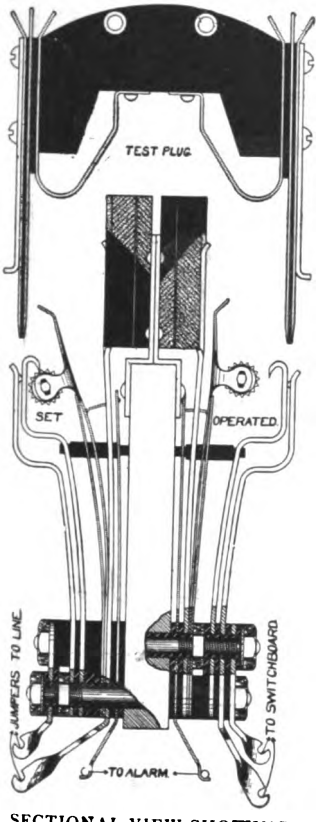

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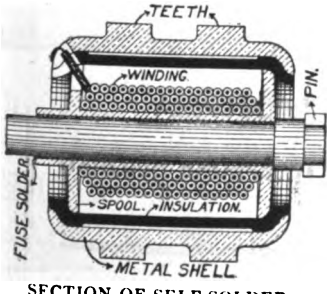
SO ARRANGED THAT ALL CIRCUITS MAY BE TESTED BY ONE INSERTION OF A TEST-PLUG WITHOUT REMOVING THE HEAT COILS OR LIGHTNING ARRESTERS



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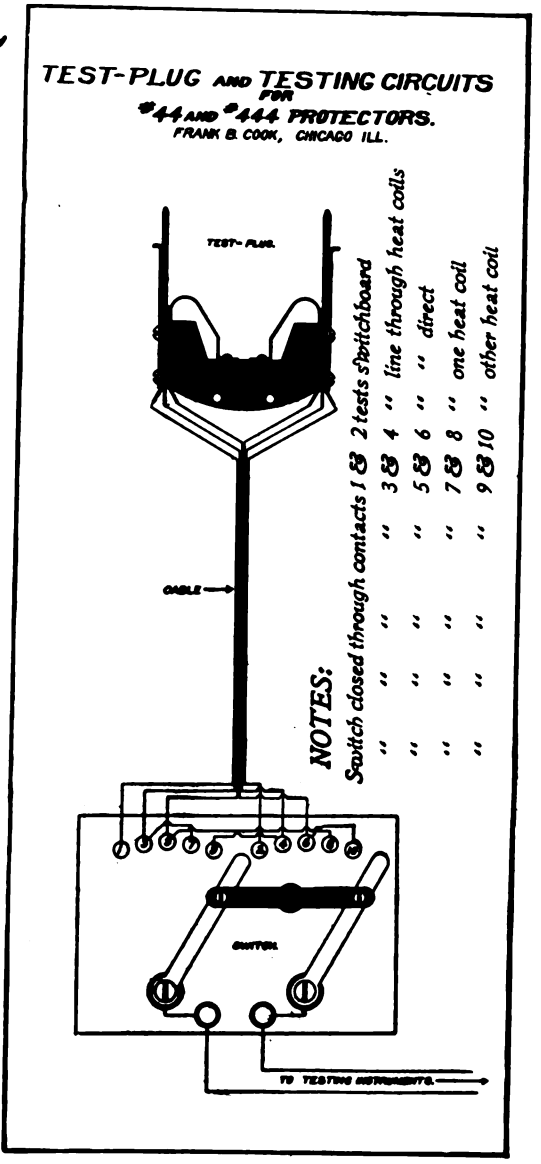
In which the circuit controlling spring can be reset in ***one operation without touching the heat coil*** or disturbing its position. ***It doesn't have to be reversed.***



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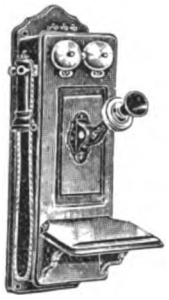
A very simple system for all Farmer and Rural Lines, by which the subscriber calls at will any other subscriber on the same line without calling central: calls central at will without calling any other subscriber. This system pleases the subscribers, saves much time to the operator, and makes the service entirely satisfactory. Ask for particulars. You will want it. We manufacture a great variety of Telephones, Switch-Boards and Specialties. Ask for catalogue M and our laughter-provoking novelty.



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Manufacturers of

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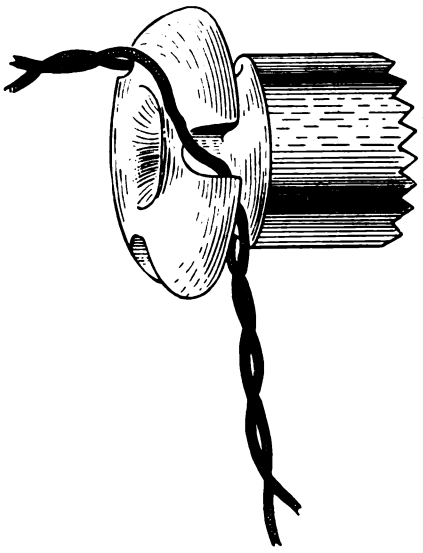

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Can't pull off.

Can run wires in any direction.

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Price per M $20.00

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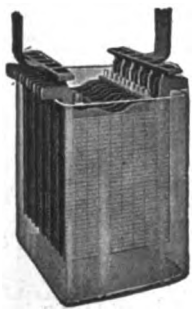

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HIGH CAPACITY — CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

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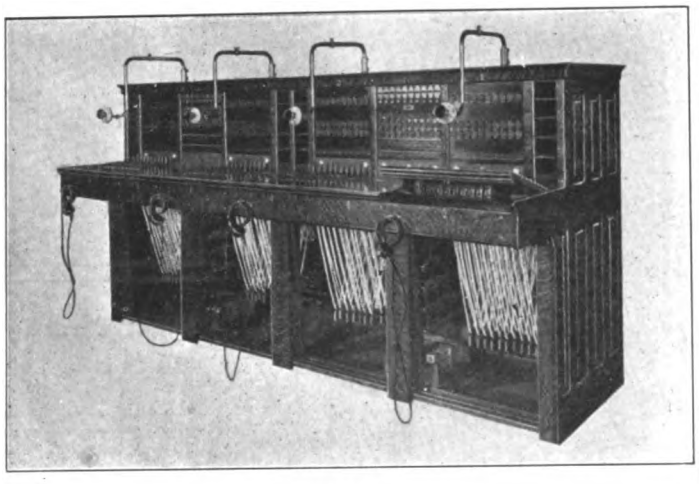
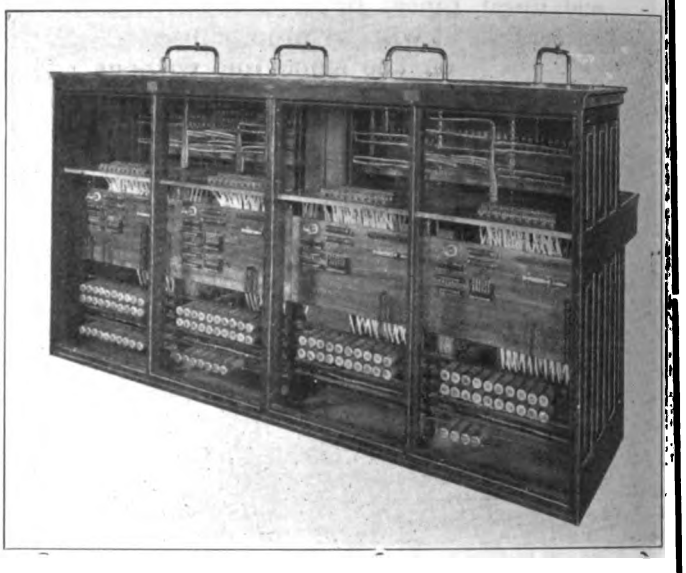
FOR ALL USES



FRONT

Four Position Board
Equipped for local and common
battery work



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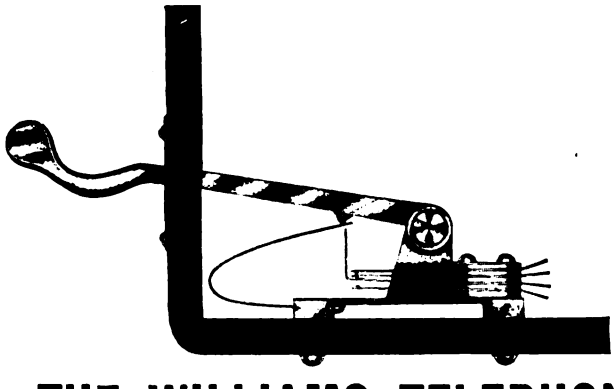
STERLING ELECTRIC CO., La Fayette, Ind.



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SWITCH HOOK

which has been pronounced by experts as **ELECTRICALLY PERFECT.** Has four genuine platinum contacts and no pivot connections. Is perfectly **BALANCED** and **ENTIRELY SELF-CONTAINED.** In fact, it is right in line with the entire output of this Company, whose aim it is to keep their apparatus up to the highest standard of excellence.

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Sound Proof Qualities

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But graceful outlines and attractive appearance are essential.

They must also be easy to keep clean.

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Your name and address will bring our catalogue.

YESBERA MANUFACTURING CO., Toledo, Ohio

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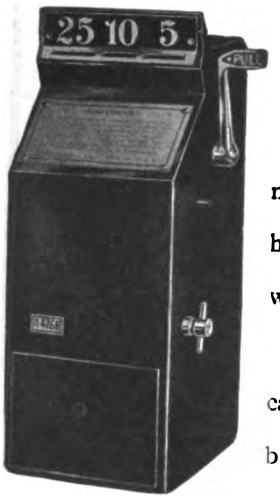
Satisfaction to Subscriber and Operator

is the one thing that has made

Baird Pay Stations



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To those interested, our catalog and net price list will be sent free.

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Every precaution is exercised in

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to see that each part is adjusted properly, and that the instrument works perfectly.

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WE HELP TO MAKE

A Good Telephone

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Our TELEPHONES are right.
Our Business Methods Clean.
Let us figure on your wants.

EASTERN TEL. MFG. CO.
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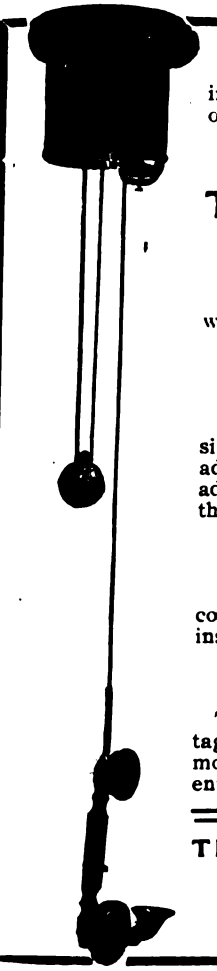

You could lie on your back on the floor, if that ungraceful attitude were customary or necessary, and use

The Pendent Telephone

with perfect ease.

This rather awkward illustration is used simply to demonstrate that the Automatic adjustability of its ***Receiver-Transmitter*** adapts it to any height, angle or distance in the ordinary room.

Central is signalled for connection or disconnection by the mere movement of the instrument for use or disuse.

There are twenty-four exclusive advantages claimed for ***The Pendent,*** to date, and more to be heard of. We shall be pleased to enumerate them on request.

THE VOUGHT-BERGER CO.,
MAKERS OF FIRST-AWARD
TELEPHONES, SWITCHBOARDS and APPLIANCES.
La Crosse, Wis.

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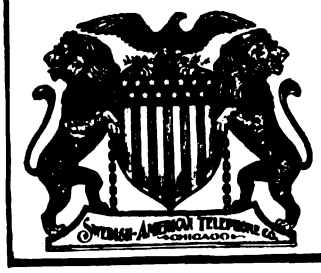
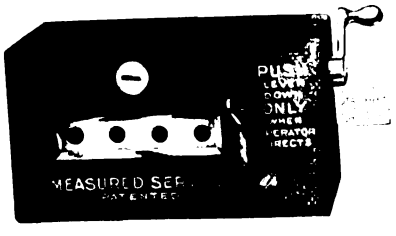
SWEDISH-AMERICAN APPARATUS
YOUR BRAINS ARE PAYING
DIVIDENDS





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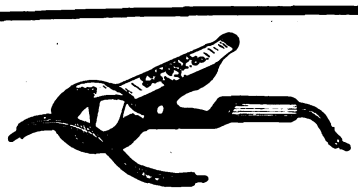
Records both at Subscriber's end and at Central Office

The Missing Link
You've all been Looking for
...TO...
Build Up Your Rates
...IS...
The Measured Service Meter

No dissatisfied Subscribers—They pay for what they get—Can't dispute the count

Measured Service Co., 153-161 S. Jefferson St., CHICAGO



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In 500 lots, 10c. each.
" 1,000 " 9c. "

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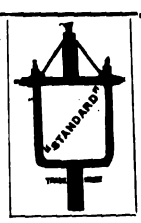
Telephone Wire  and Cables

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Aerial—Underground—Submarine Lead Covered Cables

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VOLUME 10 SATURDAY, NOVEMBER 5, 1904 NUMBER 19

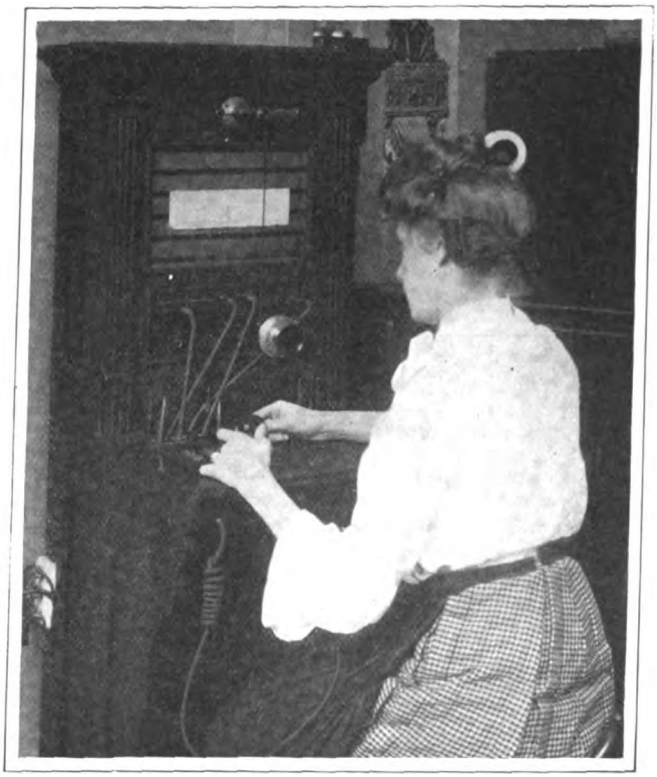
THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER.

ARTICLE III.—ITS APPLICATION.

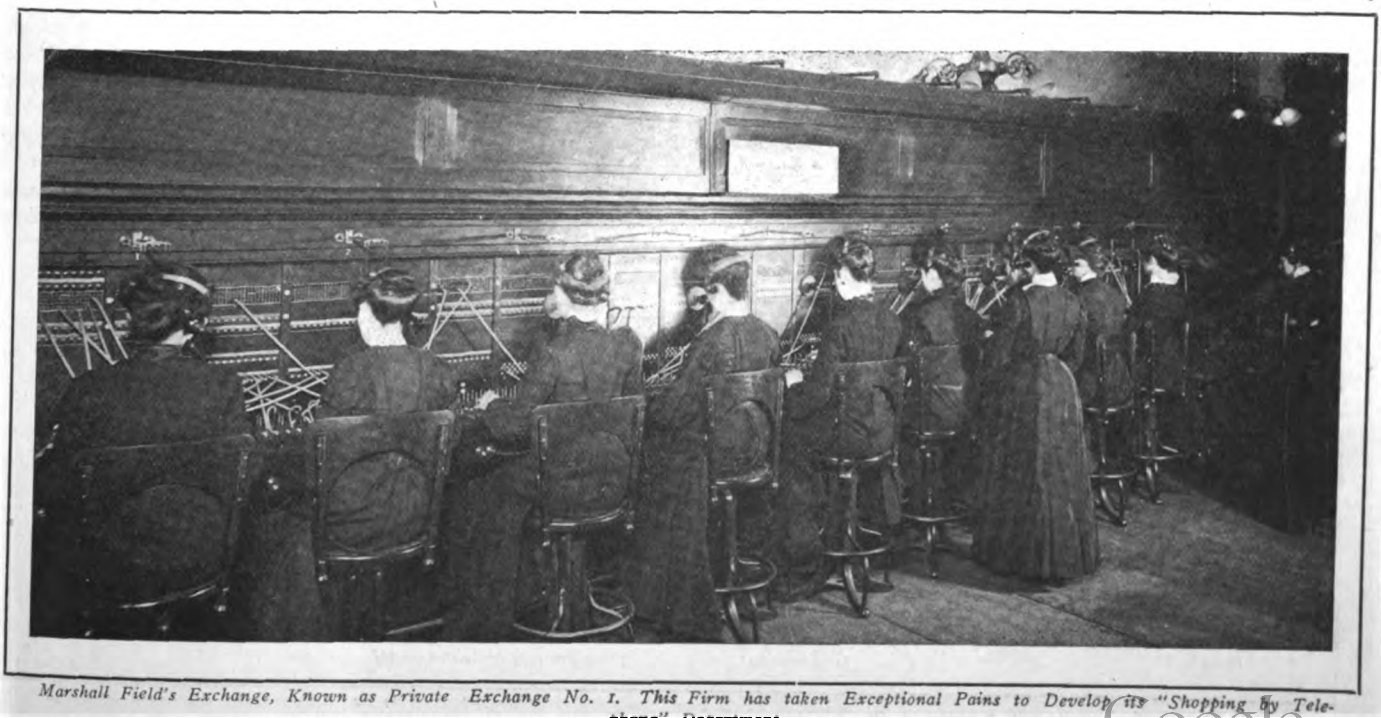
By Thos. W. Francis.

IN the conception of new and novel business methods, Chicago frequently scores a point over Eastern cities. A case in point is the recent adaptation of the telephone to the business of Marshall Field & Company.

To a moderate extent every one has long been familiar with the use of the telephone in certain kinds of buying. It is common practice for one to call up the butcher, baker or grocer, and order sundry small articles, thus saving a trip to the store in question and expediting delivery. But beyond the purchase of the ordinary daily household necessities there appears to be, in many cases, a reluctance to the use of the telephone in the purchase of goods of any kind. Probably this has largely arisen from the difficulty of accurately identifying the purchaser and of subsequently proving that the order was properly authorized in case of a disclaimer on the part of the supposed buyer. As an economizer of time and trouble and an annihilator of space the telephone is well-known, and it is therefore surprising that some astute merchant has not sooner seen the advantage which might accrue to his business from such a telephonic installation as would enable his customers to deal with him, and at the same time properly protect his business interests. Unquestionably the most extensive and successful attempt of this kind is that alluded to as having been installed by Marshall Field & Company in the largest retail store in the country. To begin with, the company installed the largest private branch exchange in the world, equipped with the most modern of switchboards, as shown in the accompanying illustration. This switchboard has fortunately received the designation of "Private Exchange One," which is so easy



Private Branch Exchange of the Indianapolis Tel. Co. Installed at Office of Levey Bros. 20 line capacity 6 cord circuits.



Marshall Field's Exchange, Known as Private Exchange No. 1. This Firm has taken Exceptional Pains to Develop its "Shopping by Telephone" Department.

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to remember that no one need consult the directory, so that every would-be purchaser picks up the telephone and asks for "Private Exchange One," and almost immediately is in direct communication with the switchboard of Marshall Field & Company's store. Each of the store's exchange operators is trained to be thoroughly posted with all of the sections which Marshall Field & Company's business includes and to know at once the proper connection which should be made to place the purchaser in communication with the division in which the desired goods are to be found.

The success which has attended this method is largely to be attributed to the system, for by training the branch exchange operators so that it becomes unnecessary for the purchaser to ascertain the department desired, and by arranging so that the purchaser is at once connected with the department, satisfaction is immediately insured. Little confusion results in getting the wrong salesmen, and mistakes are obviated by authorizing certain persons in each section to transact all telephone business with customers. By this means the customer is almost always satisfied, but in order to prevent any possible cause of complaint, Marshall Field & Company distinctly provide that they will readily exchange any goods ordered by telephone which may not be entirely satisfactory to the purchaser. In addition to the provision of the best apparatus and careful training of the operators and salesmen, a certain amount of public education is necessary in order that this system should reach its highest development, so a little booklet is prepared, which is widely distributed both throughout the store and to the public. This booklet, which is reproduced in Fig. 2, contains instructions to shoppers indicating the method to be employed when a telephone is used for this purpose. As an example: To purchase a suit of clothes by telephone would seem to be straining the art to the utmost, for it would be seemingly impossible to expect satisfaction from a purchase of this kind.

As a part of their training, both private branch exchange operators and the various department salesmen are required to exercise the greatest politeness and courtesy in all conversation with customers. The reason for this is easy to see, for the slightest brusqueness or abruptness, either in tone or in phraseology, appears to be magnified over the telephone, because one fails to see the facial play which, in many cases, goes far to explain an ameliorated sentence which in its absence strikes the ear harshly. To preserve adequate financial caution telephonic orders are received unquestioningly from those who have a regular account with the firm, while goods to parties who are unknown are sent C. O. D. Thus the worst that can happen is the expense of delivering an occasional order to persons either irresponsible or who subsequently are dissatisfied and refuse to receive the goods.

Private Branch Exchange Installed in the Office of Loveman, Joseph & Loeb, Birmingham, Alabama. This is the Largest Dry Goods Store in the South, and it has Developed a Business Along Lines Similar to those of Marshall Field & Company.

But the experience of the past year has demonstrated that the telephonic system has been a notable factor in increasing trade, and that failures or losses are so small as to be unappreciable. Most cities or towns have many stores that could profitably adopt a system of this kind and thereby markedly increase their circle of customers, particularly among those living in the suburbs.

The Rochester Telephone Company has about 60 private branch exchange subscribers, the largest installation being that in the Powers Hotel that embraces 225 stations. The exchange is equipped with a sufficient number of trunk lines to handle all business outside of the limits of the private branch exchange switchboard. The rates established by the Rochester Company are $10 for each of the private branch exchange stations, $48 for the first trunk line, and $40 for each additional trunk line. Contracts are always made upon a basis of five years, as it is inexpedient to incur the expense of the installation for a less period of time.

In Cleveland, the Cuyahoga Telephone Company serves 87 private branch exchanges containing from four or five to sixty or seventy subscribers. The smaller exchanges of three or four trunks, while those of sixty subscribers have eight or ten trunks. The rates are $12 a year per station, $84 per year for first trunk line, and $72 a year for the succeeding ones.

In Indianapolis, the charges are $40 a year for the trunk lines,

SHOPPING BY TELEPHONE

ONE of the many uses of the telephone is to "go shopping." In a great many cases it is more satisfactory than going in person, because it takes so little time. You call up the store, "Private Exchange-One"—that is easy to remember—and ask the operator for the section you wish to speak with. Tell the salesperson what you want, and he will tell you what it costs and how it comes, and when you may expect it. If you haven't an account the goods may be paid for when delivered. ¶ Owing to the growing custom of making purchases by telephone, we have made special provision in every section for prompt and intelligent attention to telephone orders.

MARSHALL FIELD AND COMPANY
(Retail Store) CHICAGO

The Art *of* Telephoning

Telephone
"Private Exchange-One"

PERHAPS more than aught else the telephone quickens the pace of progress. As a factor in social and commercial life its importance can hardly be overestimated. Undeveloped possibilities await public appreciation. Notwithstanding its extensive use, few realize the endless ways it can serve them. ¶ The telephone makes moments do the work of hours. It cancels distance, delay, formality, and superfluous conversation. Dropping the husk and the shell, it deals with the kernel of intercourse. It concentrates thought, brings out the essential points, and makes a complex problem a simple one. It penetrates the panoply of rank, and gains the ear of seclusion. While many await an interview, its message receives consideration. It changes plans, gives sanctions, secures counsels, and grasps opportunities. It places the commercial forces of a metropolis at your call. ¶ A system which makes possible these things is a marvel of mechanism, a knowledge of which silences censure with admiration and awe. A moment's delay is easily forgotten amid gratitude for the high privilege of telephoning at all. An hour at the operator's desk would beget a kind and courteous sympathy for unsuccessful effort.

MARSHALL FIELD AND COMPANY

Reduced Fac-simile of a Folder Distributed by Marshall Field and Company to Draw Attention to its "Shopping by Telephone Department."

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$30 for one-way lines, and $10 a year for stations within 500 feet of the switchboard, $20 for those between 500 and 1,000 feet, $30 where it is necessary to use conductors either upon pole lines or in conduits. Fifty-eight exchanges are in operation, varying in size from seven stations, with two or three trunk lines to 400 stations and a dozen or fifteen trunks.

The Keystone Company of Philadelphia is recording 160 private branch exchanges. Trunk lines bear a tariff of $60 per year, and the stations $12. It is estimated that about 12 per cent. of the entire traffic of the company is handled by private branch exchanges. The smallest station has eight subscribers, while the largest one accomodates over 300.

The Toledo Home Telephone Company lists 44 private branch exchanges averaging from ten to fifteen subscribers each. The number of trunk lines varies from one, where four or five subscribers are served, to five, where there are from 25 to 30 subscribers. Rates are $12 a year for private branch exchange stations and $48 for the trunk lines.

Mr. A. L. Teto, of Louisville, informs us that the Louisville Telephone Company now has about 50 private branch exchanges operating on the basis of $12 per station and $48 for trunk lines. Mr. Teto points out a notable feature in private branch exchange service in the avoidance of busy reports. By means of the branch exchange, the desk of every employee may be equipped with a telephone and consequently can answer calls immediately, otherwise it is often necessary to send from one part of the building to the other in order to get a desired correspondent to the telephone. Such procedure results in tying up the lines, and largely increasing the percentage of busy calls. The private branch exchange obviously entirely avoids this.

The Springfield-Xenia Telephone Company, of Springfield, O., has six branch exchanges. The rates are, for trunks, $36 per year and substations, $12.00 per year. These exchanges have capacities varying from four to eighty stations and from one to three trunks.

IMPEDANCE AND RETARDATION—ARTICLE VI.

By Arthur Vaughan Abbott.

IN the immediately preceding articles of this series, a rough outline has been given of the behavior of circuits which contain inductance and capacity in addition to simple ohmic resistance. In telephony, inductance and capacity play a far more important rôle than mere resistance. For example, one can easily talk through a lead pencil mark, aggregating several million ohms, but it is different to talk through a 500 ohm drop. To put a con-

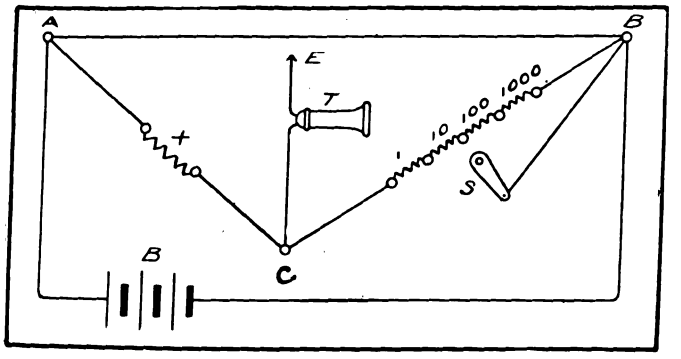

Fig. 11.

denser in a lighting or railway circuit, would be to put the plant out of commission, but through a condenser made of a couple of pennies and a bit of paper, conversation may be carried on with reasonable facility. So it is desirable for those who are in constant contact with telephonic apparatus to know the various methods whereby inductance and capacity may be measured and to cultivate some sense of familiarity therewith, and such a knowledge of the effects which they produce, as is possessed by nearly every electrician with regard to ohmic resistance.

In the construction of induction coils and retardation coils, inductance is the prominent feature, and mere ohmic resistance cuts but a very small figure. Installations which employ common battery or use automatic signaling must use condensers at the substations, and in many switchboard circuits condensers are introduced for the purpose of improving transmission. In the problem of bettering transmission over long lines, the relative proportions of inductance and capacity are to the last degree important, and success depends upon their mutual adjustment. In most cases manufacturers supply apparatus which, from their point of view at least, is best calculated for the purpose it is designed. Usually operating companies content themselves with taking such appliances as are readily obtained in the open market, and pay very little attention to the possibility of improvements. Nevertheless, telephony as an art is constantly and rapidly progressing and those who desire pre-eminence must be thoroughly posted in the relations of all fundamental principles and be able to carry on such investigations as may lead to improvement.

In a circuit containing ohmic resistance, it has been shown that the relation between current, electromotive force and resistance are given by the formula $C = \frac{E}{R}$

Also, it has been shown that if inductance be added, the formula must be modified to read $C = \frac{E}{\sqrt{R^2 + 4\pi^2 n^2 L^2}}$, in which n is the frequency or number of alternations per second and L

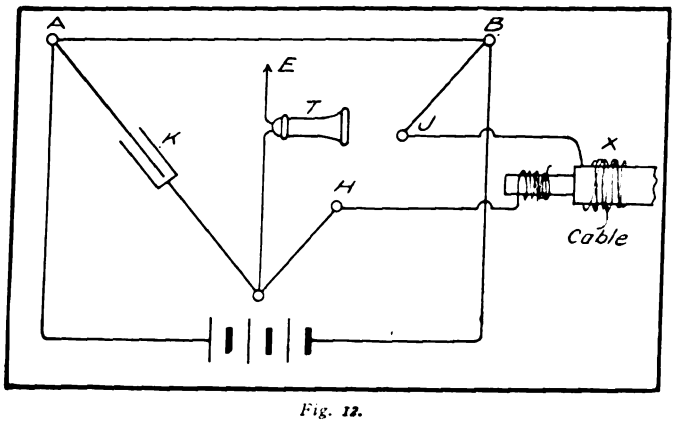

Fig. 12.

is called the coefficient inductance. That is to say, the ratio of the number of magnetic lines which are enclosed by the circuit to the current which produces them.

For, according to the C. G. S. system, a unit current is one which, flowing in a circuit of 1 cm. radius, acts on a unit magnetic pole placed at the center of the circuit with one unit force, that is generates one line of force. For example, consider a circuit bent in the form of a ring of 2 cm. in radius, carrying two units of current. As the circuit is 4 cm. in diameter, the length is 3.1415 $\times$ 4 = 12.56 cm. As there are two units of current there will be 12.56 $\times$ 2 = 25.12 units of force or magnetic lines to act on a magnet placed at the center of the circle. As there are two units of current the ratio of the lines of force produced by the current to the current is $\frac{25.12}{2} = 12.56$, hence $L = 12.56$.

In a circuit containing capacity, the relation between cur-

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rent and electromotive force is expressed by the formula

$$C = \frac{E}{\sqrt{R^2 + \frac{1}{4\pi^2 n^2 K^2}}}$$

In the preceeding equations there are the following quantities:

C = Current.
E = Electromotive force.
R = Ohmic resistance in ohms.
L = Inductance in henrys.
K = Capacity in farads.
N = Alternations per second.
$2\pi = 6.28$.

Now, if in either equation four of these quantities are known,

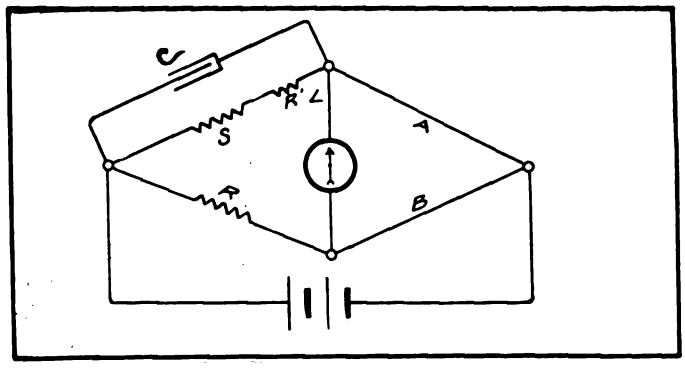

Fig. 13.

or can be measured, the remaining one can be determined. Thus, knowing the current electromotive force, resistance and frequency, the inductance L is given by the expression: $L = \frac{\sqrt{E^2 - C^2R^2}}{6.28\ n\ c}$

And for a circuit containing capacity $K = \frac{C}{6.28\ n\ \sqrt{E^2 - C^2R^2}}$

Passing now to the various methods which may be employed in measuring both inductance and capacity, the most convenient one is that using a slide wire bridge, or what is now more popularly known as an ohmmeter. The circuit of the ohmmeter is shown in Fig. 11, in which $A\ B$ is a uniform wire of known resistance. To the points A and B a source of electromotive force B is attached. In the illustration this is represented as a conventional battery, but when it is desired to make measurements on inductances or capacities, alternating current must be substituted for the battery. If an ordinary alternating lighting circuit is available, it provides a very convenient source of electromotive force. Take a piece of lamp cord from 20 to 25 feet in length. To one end of the cord attach a plug which will fit any of the lamp sockets. At any place in the cord, introduce a lamp socket, into which a 16 candle-power lamp is placed. Then provide each of the ends of the cord with a terminal made by peeling off the insulation and dipping the wire in solder, thus enabling the cord to be attached to A and B. By inserting the plug into a lamp socket, the lead is attached to the electric lighting mains, while the presence of the lamp provides a resistance that will prevent accidents in case the terminals should be unintentionally short circuited. From terminals A and B, the conductors $A\ C$ and $B\ C$ extend. Conductor $A\ C$ contains two binding posts, between which the inductance or capacity to be measured may be inserted. In conductor $B\ C$ standard resistance coils are shown. These are used in measuring resistance. But for induction or capacity tests these coils must be removed and a standard inductance or condenser, as the case may be, substituted. Then all that is necessary is to insert the unknown inductance or capacity between the terminals at X, set the switch S so as to include such a standard in $B\ C$ as appears to be best suited for the range to be measured, slide the point to and fro over the wire $A\ B$ until no sound can be perceived in the receiver T. The point E will then divide the wire $A\ B$ into two segments, $A\ E$ and $E\ B$. X is then equal to $A\ E$ divided by $E\ B$, multiplied by the standard in $B\ C$.

Fig. 12 shows another circuit for measuring capacity. Here a condenser of known value is introduced at K in place of X, shown in Fig. 11. The unknown capacity, which may be cable or any other piece of apparatus, is introduced in $B\ C$, and then the contact E is moved to and fro over the wire $A\ B$ until no sound is heard in the telephone and the amount of capacity calculated as above.

Perhaps the ohmmeter is unobtainable and it may be necessary to use the ordinary Wheatstone bridge. For this purpose the bridge should be arranged as is shown in Fig. 13, in which A and B are the rheostat arms of the bridge, R the variable arm, S a variable non-inductive resistance and $R'\ L$ the inductance to be measured, of which R' is its ohmic resistance to a continuous current previously measured, and L its inductance to be ascertained. C is a condenser placed as a shunt across the arm of the bridge, in which S and $R'\ L$ are inserted in series. The object of S is to bring the capacity required to balance the inductive resistance within reasonable limits. The balance is obtained by adjusting the mutual values of C, S and R until no deflection is produced on the galvanometer when the battery circuit is interrupted. Under these circumstances if A and B are equal, the value of L is found from the expression $L = C\ R^2$, in which R^2 is equal to the sum of S and R'. The value of this method may be extended over greater ranges by giving A and B any desired ratios, as in ordinary bridge measurements. The auxiliary resistance S is required to adjust the capacity within reasonable values to balance the inductance. If, for example,

L has a value of 4 henrys.
R' has a value of 10 ohms.
C must be equal to .01 of L, or 4,000 M. F.

Such a capacity would be beyond ordinary apparatus. By increasing R' to 1,000 ohms by the addition of the adjustable resistance S, C becomes equal to .4 M. F., an easily obtainable capacity.

A slightly different method than the preceding one is sometimes desirable for some forms of bridges. The diagram of the circuit is shown in Fig. 14, while Fig. 15 is a top plan of a bridge with all the connections made for measuring inductance, in the manner about to be described. In these illustrations, K is a condenser of known value, which may or may not be adjustable, A and B the ratio arms of the bridge, R the rheostat and R' the coil whose self-induction L is to be measured. Shift the contact along R, using the battery key Ba and the galvanometer key Ga

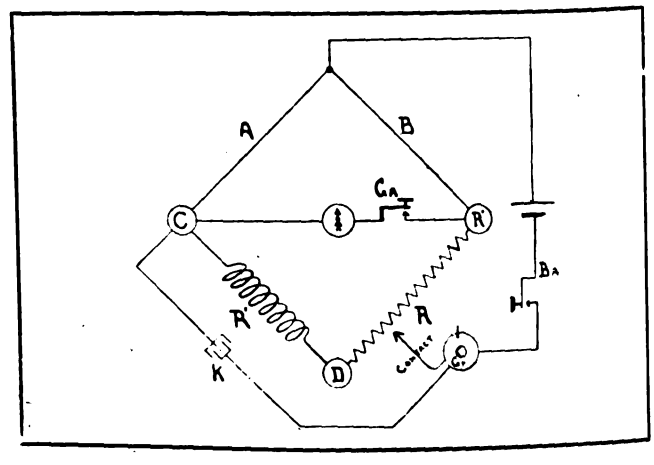

Fig. 14.

in the usual manner and then by breaking the battery circuit first. Every time the keys are closed, the galvanometer needle will momentarily deflect. The deflection will be in one direction if the quantity of the electricity discharged by the condenser is larger than that discharged by the circuit containing the inductance R'.

When the contact is shifted so as to reverse these conditions, making the quantity discharged by the coil greater than that dis-

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charged by the condenser, the throw of the needle will be in the opposite direction, and finally when these quantities are equal, the galvanometer needle will remain at zero when the battery circuit is broken. The addition of the non-inductive resistance R cuts down the discharge from inductive resistance R', while the discharge of the condenser would be lessened by a decrease of its capacity, consequently by manipulating the relative proportions of the condenser K and the resistance R a balance can be secured.

Consider, now, the circuit $R + R'$ (which does not contain

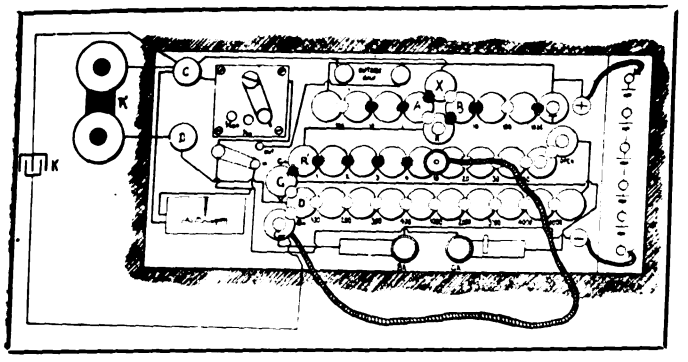

Fig. 15.

capacity), the coefficient of self-induction L, is given by the expression:

$$L = \frac{Q\ (R + R')}{C}$$

where Q is the quantity discharged on break of the battery key and C is the current.

Similarly the quantity discharged by the condenser is expressed by

$$Q = E\ K,$$

where E is the E. M. F. to which the condenser is charged.

When these quantities are equal (i. e., when balance is secured) we may substitute $E\ K$ for Q in the first equation and write:

$$L = \frac{E\ K\ (R + R')}{C}$$

But $C = \frac{E}{R + R'}$, whence

$$L = K\ (R + R')^2.$$

There is another method of measuring inductance when a current of known frequency is available, and an alternating current voltmeter and ammeter, and an adjustable non-inductive resistance. The apparatus is set up in such a way that a current of known frequency may flow through the inductive resistance to be measured and the adjustable one in series. The necessary measurements then consist in measuring the fall of potential E with the alternating current voltmeter around the inductive resistance of which the inductance is desired, and the amount of current C with the ammeter. A continuous current is substituted for the alternating current and the non-inductive resistance adjusted till the current of the same value C as was formerly used with the alternating current. Then the drop E' over the inductive resistance is measured by the voltmeter. Then the inductance L is found by solving the equation:

$$L = \frac{\sqrt{E^2 - E'^2}}{2\ \pi\ n\ c}$$

This method is subject to error, due to the current taken by the voltmeter, which must be of sufficiently high resistance as to make the current legible.

The preceding method may be employed to measure the coefficient of mutual inductance M, of two coils. Let R_1 and R_2 be the respective ohmic resistance of the coils, and L_1 and L_2 the respective coefficients of inductance. First connect the two coils in series, and measure the total inductance by the above method, obtaining a value denoted by L'. Then connect the coils in opposition, and again measure the total inductance, and denote the quantity thus obtained by L''. Then

$$L' = L_1 + L_2 + 2\ M.$$
$$L'' = L_1 + L_2 - 2\ M.$$
$$M = \frac{L' - L''}{4}$$

The following method can be used for measuring mutual inductances when a galvanometer and a battery alone are available.

Arrange a circuit, as indicated in Fig. 16, in which the first coil A is placed in series with the key K, and the battery P, and resistance R_1, while the second coil B is placed in series with the galvanometer G, and the resistance R_2. Between the points a and d a condenser C is placed as a shunt. The other extremities b and c of the resistances R_1 and R_2 are placed in series. Opening and closing the key K produces currents in the coil B, giving deflections on the galvanometer which are proportional to $M - C\ R_1$

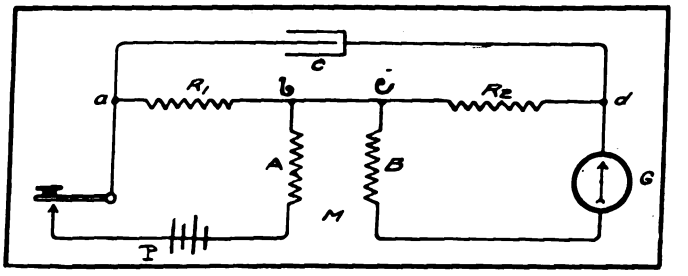

Fig. 16.

R_2. By varying the capacity of the condenser, different deflections d and d' are obtained, which have the following relation:

$$\frac{M - C\ R_1\ R_2}{d} = \frac{M - C'\ R_1\ R_2}{d'}$$

in which C and C' are the different condenser values, and d and d' the different corresponding deflections, from which the coefficient M is obtained by equation:

$$M = C\ R_1\ R_2,$$

when d reduces to zero.

A CABLE RECORD SYSTEM

By Harold A. McMann.

THE advantages to be derived from the possession and use of a compact and simple cable record system are obvious.

The following is a description of a system that has recently come within range of the writer's observation which appears to possess much merit.

The first diagram (Fig. 1) represents a filing card; this may be designated as an individual cable record card. The heading of the card gives the number of the cable, the exchange district and the street on which the cable runs.

The first and second columns note for the different sections of the cable, either between each pole or between each cable terminal; the latter is to be preferred, as hardly any benefit would be derived from showing the lengths between each pole.

The third column is for the length of the section. In the fourth

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column the size of the cable in pairs may be shown and the gauge of wire in the fifth column.

The sixth column shows the various pairs which end at the different terminal poles.

Fig. 2 shows a summary card, and is designed for the totals of the items contained on the cards as shown in Fig. 1. The numbers

CABLE NO. 3 IN THE Bradford DISTRICT
ON Decatur STREET

SECTIONS FROM	SECTIONS TO	LENGTH	SIZE	GAUGE	PAIRS
Cent. Office	Pole 3	297'	25 pair	#22	1 to 25
Pole 3	Smith St.	303'	" "	"	10 to 25
Smith St.	Hicks Ave.	250'	15 "	#19	1 to 15
Hicks Ave.	Barrow St.	275'	" "	"	1 to 15
Barrow St.	Pole 32	230'	10 "	"	16 to 25
Pole 32	Johnson Ave	260'	" "	"	5 to 14
TOTAL		1615'			

Fig. 1.

of the cables are put down in the first column, then following are columns for the subdivision of the cables according to their size. At the right hand a column is added for brief remarks, such as the condition of the cable, etc.

The usual method of using these cards is to arrange them in numerical order, the individual cable cards, as shown in Fig. 1, in a convenient box; one set, of course, being used for each exchange district. Then after the last card a summary card is inserted.

Thus all the details of any particular cable in a district may be obtained from the first cards, and the record of cables for a whole district in their entirety from the summary card.

SUMMARY OF CABLES IN Bradford DISTRICT

CABLE NUMBER	10 PAIR	15 PAIR	25 PAIR	50 PAIR	REMARKS
1	300'	285'			Good condition
2					Taken down on August 18th 04
3	490'	525'	600'		Poor
4			250'	425'	O.K.
TOTAL	790'	810'	850'	425'	

Fig. 2.

This system of keeping account of aerial cables is particularly convenient for obtaining tabulations necessary for construction of an inventory—the bugbear of average telephone man.

With slight alterations or modifications the above system could be used for underground as well as aerial cables, thus furnishing a very compact system of reference.

The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

SUBWAY COMPANIES NOT COMMON CARRIERS,

AN electrical subway company is not a common carrier and therefore not bound to furnish the use of the subway to all alike, but may withdraw the use of the subway from anyone who refuses to pay for the same. This was held by the Supreme Court of New York to be the law in a case in which the Consolidated Telegraph and Electric Subway Company of New York, constructed subways in the city streets under a contract with the Board of Electric Subways. The defendant agreed that space in the subways should be leased to any corporation having power to operate electric subways in the city and to fix a fair scale of rent to be charged for the use of such subways, scale of rents to be subject to the control, modification and revision by the Board of Electric Control.

An Electric Illuminating Company inquired what were the defendant's rates for the use of the subway, and upon being informed, presented the Subway Company with a written application for space in the subway for one year. The Subway Company did not sign any agreement and did not agree to allow the other company to continue the use of the subway for any specified time. The Illuminating Company did not pay any rent for the subway or continue to use it until the Subway Company threatened to deprive it of such use, when the Illuminating Company applied to the courts for an injunction to restrain the Subway Company from withdrawing the use of the subway. The Illuminating Company claimed that the rates fixed upon by the Subway Company were unfair.

The court refused to grant an injunction, holding that the determination as to whether the rents fixed by the defendant were fair and reasonable was for the Board of Electrical Control, and when it has passed upon the question its decision was final and not reviewable in the courts. It was further decided that the acceptance by the defendant of the Illuminating Company's application and giving verbal permission to use the highway was a mere license to use it for the period mentioned, and that the defendant might withdraw the use of the subway at any time.

Brush Electrical Illuminating Company vs. Consolidated Telegraph and Electrical Subway Company, 15 N. Y. S. 81.

DURATION OF CONTRACTS.

A CONTRACT between the Western Union Telephone Company and the Pennsylvania Company, a railroad corporation, provided for the construction, maintenance and operation of a telegraph line along the right of way of the railroad company, which was to furnish and place the poles and cross arms, while the telegraph company was to furnish the wire insulation and instruments, and operate the line, sending messages relating to the railroad business free, and having itself the commercial business. The railroad company was given the right to string a wire for its own business, and the telegraph company an additional wire, and provision was also made for the repair and renewal of the line. The line was built and operated under the agreement for many years, during which time it became an important part of the general system of the telegraph company, which by mutual agreement largely increased the number of its wires, and parol modifications were also made as to the expense of repairs and reconstruction.

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QUERIES

Questions on any subject relating to telephony will be answered on this page.

CONNECTING COILS OF MAGNET.—(446.)

In winding the coils for a telephone ringer magnet, are the coils connected together, as in the following diagram; A, A being the inside ends of the windings and B, B the outside or finishing ends; or is A of one coil connected to B of the other evil? H, H represents the hinges on the cover of the box. If you will kindly answer the above you will greatly oblige.

D. H.

If the current flows in a coil so that when facing the end of the magnet and tracing the direction of the current it circulates with the hands of a clock, that end is a south pole. If the magnet is properly connected it will have a north pole at the other end and the current circulate in the opposite direction. Tracing the

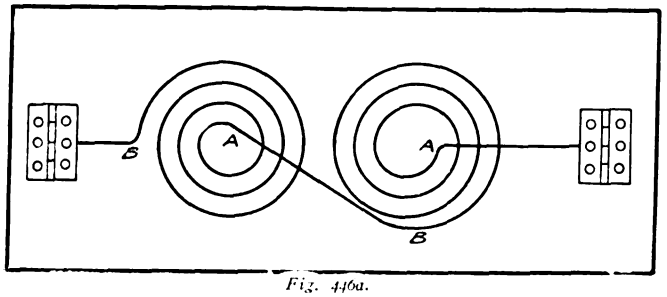

Fig. 446a.

direction from hinge to hinge, as given in Fig. 446a, similar poles would result, therefore it is evident that *A* of one coil must be connected to *B* of the other to get opposite poles.

Fig. 446b illustrates the parts of a magneto bell and generator, *N*, *S*, being the permanent magnet of the generator; *P*, *P*, the pole pieces, and *A* the armature. *N'*, *S'*, are the poles of the permanent magnet of the ringer; *f*, *e*, the sofe iron poles, and *y* the yoke. The connections between the armature of the generator and the coils are plainly discernable and need no further explanation.

AN OPERATING QUERY.—(447.)

We have an exchange of 600 subscribers, 70 per cent. residence; daily traffic averages 4,000 calls. During the past year we have been trying to pursuade the subscribers into calling by number. With few exceptions we have secured this result. Our method has been to have all operators ask parties calling by name if they know the number, if not, the operator connects the calling party with the information operator who then gives the subscriber the number of the party wanted. The party then has to get his operator and give the number in the usual way. This puts a suggestive drag into the service. The subscribers are dissatisfied with this arrangement. They claim that an operator can easily memorize the number most frequently called and that they should be allowed to extend this courtesy to the subscribers. Can you give me your opinion as to the best policy to pursue, either allowing the operator to connect when she knows the number or to putting all calls by name onto the information operator and not oblige the operator to burden herself with this inforination. G. D. W.

The situation you describe is a very common one in rural communities, and unfortunately it is often difficult, without a great deal of diplomacy, to compel the subscriber to call by number. Calling by number is the only way that calls should be made. In the first place, where calling by name is tolerated a great deal of flexibility is lost in the traffic department. Operators cannot be changed from positions on account of lack of knowledge of names; and again it is very difficult to break in a new operator. On the other hand, the drag to the service incidental to transferring calls to the information clerk is undesirable, especially where the subscriber has to call his operator over again. We would suggest your placing a notice to the effect that all calls must be made by number, explaining the reason and, if necessary, cards could be supplied upon which subscribers could mark all the numbers called most frequently. A good plan to save delay when a number is desired of the information operator, and the one most generally used, is to wire up all the operators' receivers to separate call wires ending in buttons at the information desk. Then when a party desires the information operator for a number she can tell them direct and at the same time go in on the order button connected with the operator's position which originated the call and tell her to give the connection. As an example: Suppose a call is received from 302 in position, 2 asking for Mr. Smith. The operator would give the party the information operator, who would then tell the caller Mr. Smith's number (346) and at the same time go in on the circuit to the operator at position 2 and say, 346 for 302, or else 346 for—giving the number of the information trunk to which 302 is connected.

CONDENSERS.—(448.)

Will you please explain to me about a condenser, the various kinds, etc. Are there any different kinds made? Why are some bridged and some cut in series? Is there a noise condenser? J. W. R.

To answer your questions regarding condensers in full would require a complete treatise on electricity. It is only practical for us to briefly state that when any conductor is connected with a source of electricity, the conductor acts as if it absorbed or retained a portion of the electricity and so the conductor is said to possess capacity. The quantity of electricity which a conductor can absorb depends upon the shape of the conductor and the insulating material with which it is surrounded. The larger the service of the conductor, the greater the quantity of electricity which it can absorb. Various insulating substances also possess different powers of absorption, which is usually termed specific inductive capacity, and further the amount of electricity which can be absorbed is inversely proportional to the thickness of the insulating material. Condenser is a contrivance that is made to absorb electricity and usually consists of two thin sheets of metal such as tinfoil which are separated by an insulator, such as a piece of paper impregnated with paffin. So telephone condensers are made from two long sheets of tinfoil rolled into a flat package, which is separated by a strip of paper.

Another form of condenser is the leyden jar, which is simply a glass jar bottle, coated on the inside and outside, which operates in precisely the same manner. An alternating current cannot

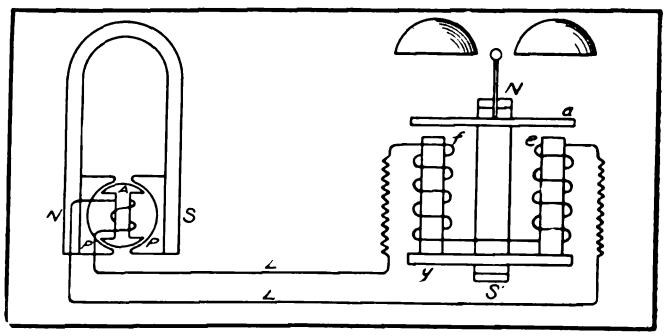

Fig. 446b.

pass through a condenser, but a continuous current is enabled to. Hence, the chief use of a condenser in telephony is to open a telephone circuit to a continuous current, such as is given by a battery while allowing the alternating current of the transmitter to pass through it. For this reason condensers in telephony are almost invariably used in series with the line and are very rarely if ever bridged.

We do not know what you mean by the term a noise condenser, and therefore we are unable toanswer this part of your inquiry.

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"OUR BIASED AND NARROW EDITORIALS."

THE management of this paper has in the past had more or less to say concerning the loyalty of its subscribers. We have endeavored to accept this loyalty in a modest, if grateful spirit, and it is our hope that we have not been led to boast of it unduly. It is undeniable, however, that we have been much gratified by the remarkable fact, said by competent authorities to be almost without parallel, that in the last three years we have had less than two dozen discontinuances. Without exception, even these few discontinuances were based on fair reasons. This man had gone out of the telephone business and had no further use for a telephone paper; the other had transferred his services to a new telephone company which was already taking the paper; here and there two or more companies were consolidated, and therefore they consolidated their subscriptions.

In view of this general condition, we were considerably shocked recently by the receipt of a request from the secretary of a small but prosperous telephone company in Illinois, asking that we discontinue his paper and giving the following reason for his action:

> "I think your editorials biased and narrow. While I am Independent and always have been, I think it better to look for methods of better conducting our own business than to harangue a competitor whom in the same breath we call a dead letter."

This statement strikes us as so extraordinary coming from a man whose battles we are fighting that we deem it advisable to make formal answer in these columns. We will, therefore, endeavor to justify our position to this gentleman by detailing the facts connected with a recent transaction of the Bell Telephone Company in the State of New York.

During the past two years the lethargy which had previously characterized Independent telephone development in the East, began to give way before what the Independent Consolidated Telephone Company, of Wisconsin, in a recently issued prospectus describes as the "active missionary work carried on by THE AMERICAN TELEPHONE JOURNAL." "As a result of this missionary work," continues this prospectus—

> "The eyes of the Eastern people are finally opened, and Independent telephone promotion is being pushed at a rate that promises to rival the intense activity of the Middle West. A list of thirty-four towns in Western New York outside of Buffalo shows an aggregate list of 21,585 Independent subscribers as against 12,150 Bell subscribers.
>
> "The city of Buffalo now has an Independent exchange of nearly 6,000 subscribers."

This statement on the part of the Wisconsin company, which, in so far as it applies to the number of Independent telephones, is very conservative—for there are nearer 50,000 than 20,000 in the western part of New York State to-day—would seem to furnish a sufficiently strong proof of the wisdom of our editorial course. But, it may be contended, it does not justify "biased and narrow" editorials. No amount of Independent development or industrial development of any kind can justify a biased and narrow editorial course. The question then is, has the course of THE AMERICAN TELEPHONE JOURNAL been biased in its attitude towards the Bell? A graphic answer is to be found in the recent transaction alluded to.

At Johnstown and Gloversville, two of the most thriving places in Fulton County, New York, the Glen Telephone Company had built up through good service and low rates a telephone system that promised to be one of the strongest in the State. It had practically driven the Bell out of business and was giving service to something over 3,000 subscribers. The Bell exchanges had virtually nothing left, except a little long-distance business. The Bell apparatus, as is usual in places of this character, was antiquated. The sympathies of the people were with the Independents, and this, taken in connection with the wretched service offered by the Bell, left the old-time company in a hopeless position. In other directions, also, the Bell Company was being seriously menaced. Throughout the section of the State adjacent to Fulton County, Independent lines are growing up at a rate that is amazing. Independent long-distance connections are being steadily pushed towards Gloversville and Johnstown, and there is building up a system of telephones on all sides that promised to give the Glen Company so many connections that all hope of the Bell re-establishing itself was out of the question.

ALL INDEPENDENTS SHOULD READ THIS.

At this stage the Boston gentlemen, who direct the destinies of the Bell enterprises throughout the country, executed a coup. Almost over night they effected a "consolidation" with the Glen Company. By the terms of this consolidation, the Hudson River Bell, which controls that territory, agreed to withdraw from Johnstown and Gloversville and turn over all its business and apparatus there to the Independent. The conditions attached to this consolidation were that the Glen Company should substitute Bell transmitters and receivers and agree to turn over all its long-distance business to the Bell.

The method by which this "consolidation" was effected has not been made public. Naturally the gentlemen who control the interests of the Glen are not disposed to give away their private business affairs. They profess to be thoroughly satisfied with the bargain, and say that it relieves them of the danger of a rate war, which the Bell had threatened. Be that as it may, so far in this transaction no one had any right to complain of either of the parties. If the Glen Company's stockholders chose to get away from the Independent alliance and tie themselves to the Bell, that was their own affair, provided, of course, they can justify their course to their subscribers and to the public that granted them the franchise in Fulton County with the understanding that they would protect the citizens against the exactions of a monopoly. But having effected this deal, the Bell people are pursuing a course that *does* give honest people the right to complain, even at the risk of being classed as biased and narrow. This course is one usual with the Bell in cases of this kind, and consists in spreading broadcast misleading statements of the transaction. These statements are presented in those papers in Western New York that are willing to sell their reading columns for a price. Among others of these purchasable papers were the Utica (N. Y.) *Press*, the *Union*, of Dunkirk, and the *Palladium*, of Oswego. The *Palladium* unfortunately committed a little indiscretion. In that paper the matter appeared in the shape of an editorial, but at the bottom was the fatal hall mark:

oct17d1t

This hall mark reveals to the initiated that this alleged editorial was to be published in the "daily of October 17th, one time." The Utica *Press* was more discreet and more dishonest towards its readers. It published the article in the shape of a dispatch under a New York City date line. The Dunkirk *Union* was equally dishonest towards its patrons by publishing the matter as an alleged local article, without marks, so that its readers, of

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course, accepted it as legitimate news matter. In all three of these papers, however, the editors were so slothful and inapt that they did not take the trouble to alter a single word, nor even to differentiate in the paragraphing of the matter.

It is unnecessary to produce this statement in full or to answer it at length, but it may not be amiss to assure our friends of the Bell that there is anything but a feeling of panic among the Independent interests operating in New York State on account of this transaction," as these corrupted newspapers set forth. On the contrary, the transaction has cemented the several loose ends of the Independent business in that section of the State, and has strengthened the feeling of co-operation that in the past has not been as strong as might be desired among the various Independent organizations. It has also brought into active interest a strong group of capitalists who have large Independent holdings that have proved profitable to them. These gentlemen have begun a campaign, the result of which is going to be somewhat startling to the Bell promoters. Already plans are under way to surround the towns of Gloversville and Johnstown with the strongest telephone service known anywhere in the country. Literally, every hamlet and every farmhouse will be equipped with an Independent instrument, and before long the business men and residents of Johnstown and Gloversville will find themselves under the necessity of throwing out the telephones controlled by the Bell interests or else permitting themselves to be cut off absolutely from communication with their immediate neighbors, on whom they must depend for support. Instead of weakening the Independent situation in New York, this deal on the part of the Bell will serve to make it stronger than it ever was before. It has aroused the fighting blood of a company of men, who in their fields have demonstrated what they can do in competition; men with unlimited means and unbounded energy; men who have shown themselves masterful executives; who, wherever they have come in competition with the Bell have invariably triumphed, and who have built up systems not only in New York State but elsewhere that are models of their kind. These men have created exchanges in the greatest strongholds of the Bell, exchanges that are paying substantial dividends and are now giving ten connections where the Bell gives one. These men are not hunting a fight. But neither are they running away from one, and when they have a situation like this thrust upon them, they will meet it in a way that will ultimately result in putting the Hudson River Bell Telephone Company where the Michigan, the Erie and the Central Union were landed. These three great Bell concerns were foolish enough to pursue in the West somewhat the same tactics that the Hudson River is now pursuing in the East. They wound up bankrupt. If the eastern Bell corporation escapes a similar fate, it will be because its officers are clever enough to saddle their troubles on foolish investors in their stocks, and still more foolish Independent companies who are short-sighted enough to enter into "consolidation" deals.

"Owing to the broad lines on which it is building up its business," recites the paid article from which we have already quoted above, "the Bell Company ultimately is going to triumph over its rivals," and the Independents are all going to be down and out. Even at the cost of being considered "biased and narrow," we venture modestly but firmly to doubt this. We venture to point those who reason along this line to a short but significant statement made recently by Henry Clews, the well-known financier, in an article in the *Cosmopolitan Magazine*. Discussing "Wall Street's Wild Speculation—1900 to 1904," Mr. Clews winds up by saying:

> "But meanwhile one bad sign is noteworthy: The large corporations being unable to market new bond issues, are borrowing heavily from banking syndicates at .ve to six per cent. on notes running from one to three years. There is danger in this, and the way of the borrower on these terms may, like that of the transgressor, be hard."

The American Bell Telephone Company in its sore need to support the campaign that many of its constituent companies are conducting on a losing basis throughout the United States, was one of the largest of the "large corporations," who, being unable to market new bond issues, "borrowed heavily from banking syndicates." The Bell directors raised in this dangerous fashion $20,000,000, which must be repaid at the end of three years. When the notes on which this $20,000,000 was borrowed, fall due there will be some hard times in Boston, unless the Bell company learns very soon to see the light and to conduct its business on a legitimate basis, instead of along the lines that are being so graphically described by Mr. Lawson in *Everybody's Magazine*, under the title of "Frenzied Finance."

SOUTHWESTERN KANSAS ASSOCIATION HOLDS MEETING

At the recent meeting of the Southwestern Kansas Independent Telephone Association, held at Wichita, some very interesting and encouraging reports were made. Since the last meeting in July three trunk lines were built from Wichita to Newton, Wellington and Winfield. Three more trunk lines are to be built from Wichita to Hutchinson, Blackwell, Oklahoma, and Kingman. These will be all copper and the highest grade of long-distance construction. The line to Newton will be extended to Herrington, giving connections with Kansas City.

This line will be one of the most important to Wichita, as it will give this city direct connection over Independent lines to Topeka, Kansas City, St. Louis and Cincinnati. It will make connections at way points, but eventually a direct line will be built to Kansas City.

The association proposes to put up trunk copper lines between all important points in the State, and the local lines will connect with nearly every village within a radius of 150 miles, and will also be kept up to give good country service.

The trunk line to Oklahoma is to be extended to Oklahoma City, where it will connect with the Independent lines to Texas, giving connection with Dallas, Fort Worth, San Antonio and Galveston.

Rural lines formed an interesting topic for discussion, and reports from the different companies showed that wonderful progress had been made in this direction. All the companies are building country lines for the benefit of farmers, it being stated that over 200 miles of country lines had been built in the vicinity of Wichita in the past three months. The financial reports of the association were extremely gratifying, every company reporting good business and profitable ventures in every department. It was also stated by each company that no financial assistance was needed to carry out its plans and that no foreign money had been invested in any of the enterprises.

The association is composed of 24 of the strongest Independent telephone companies of the State and all were represented. The organization took place last winter, and Wichita was made the permanent headquarters. Four meetings are held here every year. At the first meeting the following officers were elected, who are still serving: C. C. Vandeventer, president; C. Gibson, vice-president; H. D. McVay, secretary; Finlay Ross, treasurer.

NORTHWESTERN INDEPENDENTS TO HOLD A MEETING.

The Independent telephone men of the northwest will hold their annual meeting in Sioux Falls in January. The exact date has not yet been determined upon. The territory covered by these Independent lines is all of South Dakota east of the Missouri River, Southwestern Minnesota and Northwestern Iowa. From seventy-five to 100 delegates are expected to be present.

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IN THE OPERATING FIELD.

NEW YORK STATE ASSOCIATION TO REORGANIZE.

AT a meeting of the executive committee of the New York State Independent Telephone Association, held at Rochester, recently, it was decided to amend the constitution and by-laws of the association so that it might become a member of the National Association. The National Association has adopted a constitution and by-laws modelled aftter the general plan of district organization as developed in Ohio. This plan was somewhat different from that which had been followed by the State associations already in existence, and to conform with it they will have to make some changes.

At the New York meeting it was decided to divide the State into twelve districts, and to proceed at once with their organization. This organization will consist of the election of officers for each of the districts, and the choosing of delegate representatives. H. H. Persons was elected trustee of the National Association for New York State.

James B. Hoge, president of the National Association of Independents, was present at the New York meeting. Speaking of it on his return to Cleveland he said: "I am more than pleased with the conditions I found in Independent telephone circles in New York. The whole field seems to be prosperous and flourishing. There is much interest being taken in the work, and the State will soon be fully organized along the lines of the National Association."

A SUCCESSFUL OHIO COMPANY.

ONE of the most successful small telephone companies of Ohio is the Jefferson & Warren Telephone Company, of Orangeville, Ohio. This company was organized in 1896, and now has 875 telephones. The company has just paid its twenty-fifth quarterly dividend. It has an authorized capital of $80,000 and an outstanding capital stock of $73,175. The statement for the year ending October 1 is as follows: Gross earnings, $16,049.41; operating, $9,051.01; net earnings, $6,998.40.

A SUCCESSFUL INDIANA COMPANY.

THE Home Telephone and Telegraph Company is one of the prosperous institutions owned and organized by Fort Wayne people. It began business in 1896, and to-day has 3,200 telephones in service and is each day adding new subscribers.

It has commodious offices in the Home Telephone Building, a handsome three-story structure, owned and built by the company. In addition it owns the stone and brick building at the corner of Calhoun and Masterson streets, where from the south side lines are operated.

The stockholders number nearly 150 people. The long-distance service is done over the lines of the National Telephone and Telegraph Company, which is closely allied to the Home company, although a separate organization, also owned by Fort Wayne capitalists.

The lines of the National Telephone Company thoroughly cover Northern Indiana and reach into Michigan and Ohio. It also owns local exchanges at Kendallville, Auburn, New Haven, Sturgis, Mich., Avilla and other points.

The business of the National Telephone Company has more than doubled in the last two years and new copper toll lines are constantly being built. Both the Home and the National Company have a stock issue of $250,000, on which dividends have been paid regularly for years. The officers are as follows:

Home Company—Directors: Charles S. Bash, president; John P. Reuss, vice-president; Wm. L. Moellering, secretary; Max B. Fisher, treasurer; Isidor Lehman, P. W. Smith, G. Max Hoffman, W. A. Bohn.

National Company—Directors: Henry C. Paul, president; Chas. S. Bash, vice-president; Wm. L. Moellering, secretary; W. A. Bohn, treasurer; Samuel S. Fisher, A. E. C. Becker, G. Max Hoffman, J. M. McKay, E. M. Popp. The management of both companies being in the hands of the secretary, Wm. L. Moellering.

THE CUMBERLAND RAISES RATES.

THE Cumberland Telephone Company has increased its rates to such an extent at Henderson, Tenn., that a movement has been started to organize an Independent company. The service given has been very unsatisfactory and the failure to better this condition at the expense of higher rates has given a great impetus to the organization of a competing company which will be granted a franchise in the near future.

CUYAHOGA'S INCREASED BUSINESS.

THE increase of business of the Cuyahoga Co. for the period between March and October has been beyond expectations. On March 9, at the time when the company's new switch board was placed in service, there were 10,219 Cuyahoga telephones in operation in Cleveland. The figures on Oct. 9 show 12,955. The net increase for this time has been 2,640, or an average of 377 a month. One of the significant things about the report is that the figures for the last of the period show the same rate of increase as those of the first. The last report at hand at the time of writing was for October 11. The figures for that day showed 22 telephones contracted for, or a net increase in the company's income of $613.

This is the largest gain in a similare length of time that the Cuyahoga Co. has ever made. President Dickson attributes it largely to the superior service that is given by the new switchboard.

REPORTED CONSOLIDATION OF PENNSYLVANIA COMPANY WITH UNITED STATES COMPANY.

THE Consolidated Telephone Companies of Pennsylvania, with a system of exchanges extending from McKeesport to Norristown, it is reported, have entered into negotiations for the sale of its properties to the United States Telephone Company, whose plan is to establish a trunk line from New York, via Philadelphia, to Chicago.

Under the plan the United States Company is to come into possession of the Independent exchanges at Norristown, Reading, Allentown, Scranton, Wilkesbarre, Mauch Chunk, Harrisburg, Altoona and McKeesport, all having connection with the Keystone, of Philadelphia.

WASPS' WAR ON TELEPHONES.

IT is reported that the Chinese and Japanese Telephone Company of Shanghai, has its aerial wires, which are enveloped in lead pipes, attacked by wasps which breed in bamboos. In July or August they bore holes in stems to lay their eggs clear of birds. In default of bamboos they have done the like with the lead covering of the cables. The company has coated the lead with boiled linseed oil and canvas, which the insects cannot penetrate.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A NEW MEASURED SERVICE METER.

A TELEPHONE meter for measured service, by which a patron makes his own record of each time he calls, has just been put on the market by the Measured Service Company, 153, 155, 157 and 159 S. Jefferson street, Chicago, Ill. The meter is designed for either trunk or party lines, and is already being used by several large companies. The meter, a photograph of which is shown in Fig. 2, is operated by the patron, in front of his eyes, and leaves no possibility of dispute by him. The counter, it is claimed, cannot be beaten, a buzzer signal being given to the operator after the meter record has been made.

The particular advantage lies in the fact that statements can be obtained in the central office over the wire at any time desired of the total number of calls used during a given time. Telephone companies can therefore extend their patrons credit, rendering them a statement of the amount due for service rendered, which will correspond with the figures on the dial of the meter. The point urged is that telephone companies can greatly increase their clientage, as well as the total number of calls used, through the facilities offered by this meter for the credit system.

It is asserted that the meter relieves telephone companies of the vast amount of detail work in connection with keeping a record of all accumulated cells. It is read in the auditor's or treasurer's office in printed form, thus eliminating this work from the operators.

A diagram of the circuits of the meter is shown in Fig. 1 for a central energy system. Diagrams for any system may be obtained by applying to the Measured Service Company.

The operation of the meter is as follows: When a connection is made, the calling party pulls the small lever at the front of the small black box, which is 4¾ x 2¾ x 2 inches, and is placed at the substation. This throws a buzz over the wire, notifying the operator that the subscriber has registered. The call is shown on the face of the meter. At the end of a certain period, when it is required to take statements, the record-taker or central office machine is placed in connection with the substation device. The party is called and asked to turn the large crank at the end of the meter. This operation takes a statement on a tape by Morse code at the central office of the number of calls made since the last reading. One portable statement-taker will do the work of the entire exchange. It acts so rapidly that even where the number of calls is as high as ten thousand the record will be transmitted in a few seconds.

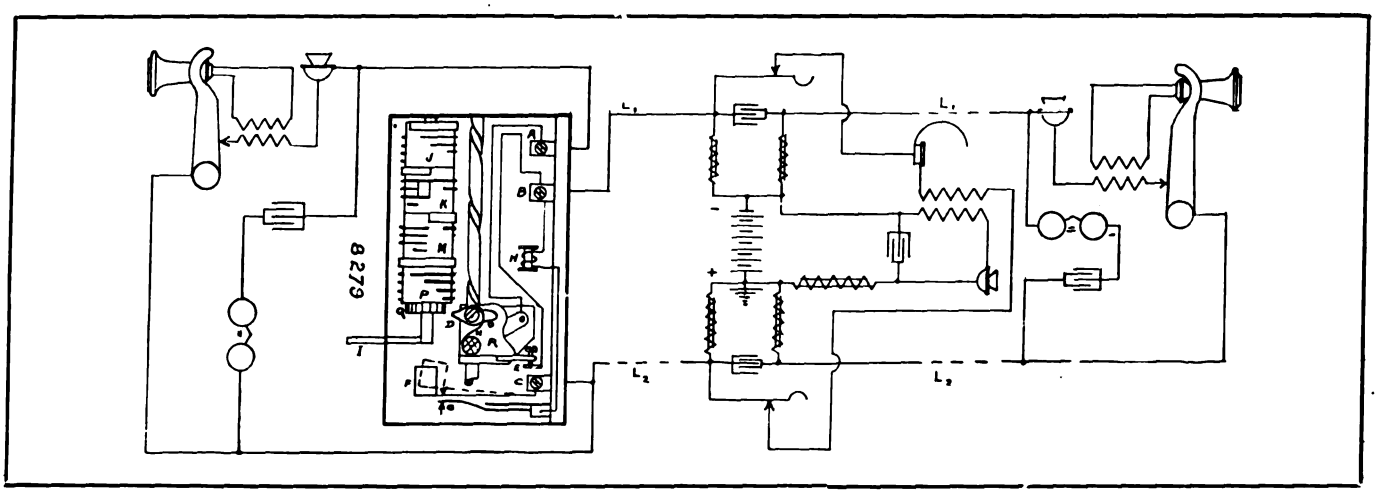

Fig. 1.

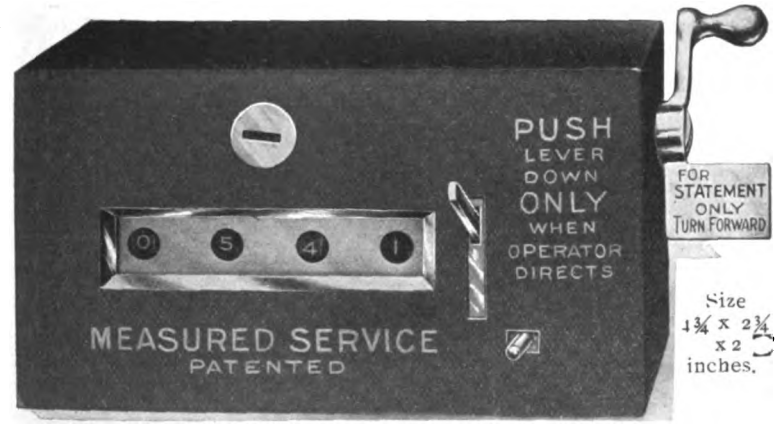

Fig. 2.

The Measured Service Company is covering the United States with demonstrators, showing a working device complete. They will be glad to have a demonstrator call on any telephone company on request, and will also send descriptive literature, circuits, prices, etc.

INSURANCE AGAINST SHOCK.

THE International Telephone Manufacturing Company, of Chicago, it is said, is making its central energy, as well as generator-call, wall and desk telephones, completely eliminating the use of any of the exposed metal parts forming a part of the circuit at any time, thus preventing the user from receiving an electrical shock when using the telephone.

telephone apparatus in view of the many accidents that are constantly occurring from the use of instruments in which circuits are completed through outside metal parts.

One of the most peculiar accidents of this kind recently occurred at Indianapolis, Indiana, as will be seen from the following article from the Chicago *Tribune*, October 29th:

INDIANAPOLIS, IND., Oct. 28.—[Special.]—James Adams of 1624 Cornel avenue is lying in a paralyzed condition at his home as

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the result of an electric shock received from a telephone he was using in the office of a local coalc ompany.

He was standin gat adesk on which were two telephones, the New and the Central Union telephones. He first used the Central Union telephone, and, not succeeding in getting his number, tried the New telephone.

Adams took the receiver, and, while waiting for his number, rested his chin on the top of the Central Union telephone. A shock resulted that rendered him unconscious.

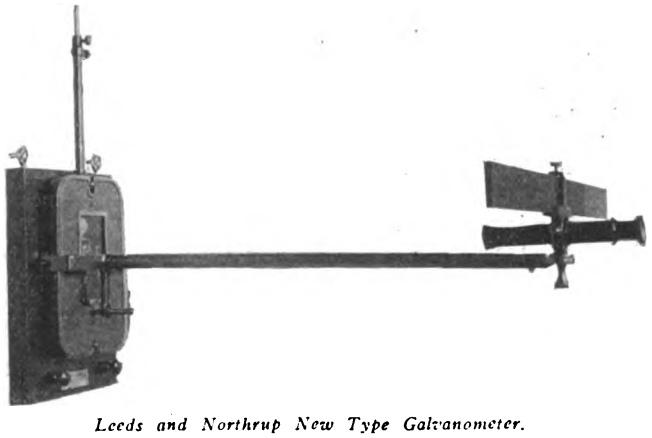
He was soon revived, but, when an attempt was made to move him it was discovered that he was paralyzed from his waist to his feet.

The International Company in designing its apparatus considered these points as one of the most essential in the telephone system, especially for large cities or even rural exchange where there is considerable danger from lightning, and have carried out in every detail the idea of perfectly concealing all working parts of the apparatus and insulating all exposed metal parts throughout their entire system.

NEW GALVANOMETER FOR TELEPHONE TESTING.

THE Leeds & Northrup Co., of Philadelphia, is just placing on the market a high-grade but inexpensive galvonometer of finished workmanship and commendable working qualities that will be interesting to all telephone companies.

The uses of a galvanometer in telephone work are numerous.



Leeds and Northrup New Type Galvanometer.

They usually require a man with considerable experience to handle a high-grade instrument.

The new type of galvanometer is quite complete in itself, being furnished as the illustration shows with a telescope, arm and adjustable scale. This scale with its telescope can be detached from the instrument by simply lifting it off its supports and can be hung upon the wall alongside the instrument when not in use.

The galvanometer may be set up ready for working with the greatest ease. It is only necessary to drive two screws in the wall and hang the galvanometer upon them by means of two eye screws in the back board By simply screwing the eye screws in and out the galvanometer is made to hang vertical when its coil will hang free.

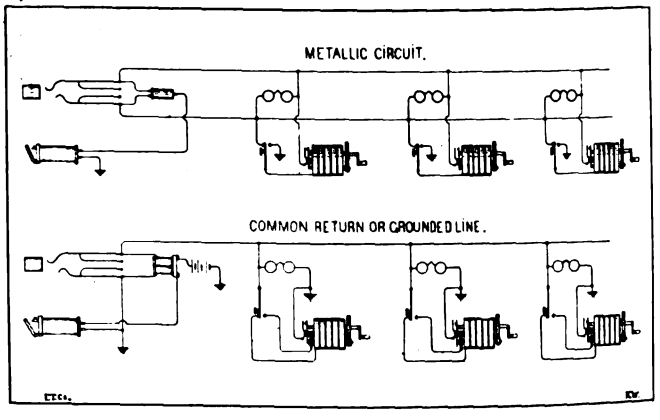
The wide clearance between coil and pole faces make the usually tedious operation of getting the system to swing free, an operation of extreme simplicity, making it possible for an ordinary employee to test out the line with the least delay and little expense to the company.

The galvanometer is of the D'Arsonval type, and is not influenced by magnetic fields. This new instrument is known as the Type P. Defects have all been eliminated, by careful designing and extensive experiments, and the following good features have been evolved. It is of pleasing and graceful appearance, embodying a finish given to expensive scientific instruments. It has a moving system or coil which is always wholly visible. A proportional scale for either steady currents or ballistic workings is furnished.

The coil is magnetically damped, thus giving a quick return to zero with rapid working as a result. Has large, clear scale that is very easy to find and easy to read without fatigue, and a strong suspension that gives no zero shift and which is not easily broken and can be readily replaced. This instrument is being made in quantity by jigs and tools according to a fixed pattern, and is sold at the extremely low price of $20.00. The Leeds & Northrup Company will be glad to furnish further information and complete bulletins to those interested.

RURAL LINE TELEPHONE SYSTEM.

WHERE a number of rural subscribers are connected with central by means of a common line there are several objectionable features in the present practice, among which perhaps, the worst is the necessity of disturbing central every time one of the subscribers calls another. It is customary to have a code of calls by which subscribers on the line can call each other, and it is very annoying to the operator to have her attention called to the line whenever one subscriber calls another, and especially where there are several such lines entering the switchboard and going to the position of one operator. In addition to her regular work in answering her subscribers on single lines, the operator must always be on the alert for a signal for central on these rural lines, which is usually indicated by the buzzing of one of the line drops or by the ringing of an extension bell. In the ordinary method the operator answers innumerable times only to find that she was not wanted.



Ericsson Rural Electric Signalling System.

The Ericsson Telephone Company, 296 Broadway, N. Y. City, has recently placed on the market devices for metallic circuit, common return or grounded rural lines, which entirely overcome these annoyances at the switchboard in the operation of such lines. By means of these devices, the subscribers can call each other without calling central or without central knowing that one subscriber has called another or that they are conversing together. Also the subscriber can call central without calling any other subscriber or disturbing any one else. By this means the operator is relieved of the constant attention necessary on the rural lines,

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—Independent magneto plant in Southern town, 3,500 population; 200 drop switchboard; 150 drops in operation; gross annual income $3,500; fixed expense $1,300; in operation five years; no competition; town and plant growing fast; price, $10,000. Address Box 255, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 255

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

FOR SALE.—Telephone Exchange in town of 850. Equipped with Stromberg board; North Telephones; 65 local subscribers; 15 party lines; good connections. Further particulars given on request. Address Everton Telephone Co., Everton, Mo. 271

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—A first-class business man with administrative capacity to act as general manager of a telephone company operating upwards of 10,000 telephones. One having practical telephone experience, including the operation of toll lines, preferred. State age, experience, and give references. Address Box 266, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 266

WANTED—Position by expert switchboard man, good wire chief and all-round telephone man, capable of improving your service. Address Box 256, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 256

WANTED—Position; nine years in the business; married; sober; can get and hold business; at present assistant manager with company having 14 exchanges, about 400 miles of toll line. Would accept position as manager with appreciative company having undeveloped territory which by proper handling and untiring effort could be built up. Address Box 267, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 267

WANTED.—Manager of exchange of 300 common battery and magneto telephones, located in New York State. Good salary at start, and steady increase to right man. Only hustlers who want and can earn good pay need apply. Address Box 259, care THE AMERICAN TELEPHONE JOURNAL, N. Y. 259

AM open, any time between now and March 1, for position as superintendent or manager of exchange. Am, at present, managing a system built by me, but want larger field. Fifteen years' experience in all branches of telephone business. Would accept good position other than above mentioned. Best of references furnished. Address Box 268, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 268

WANTED—Position as manager or superintendent of Independent exchange. Am temperate, married, and have had four years' practical experience. Address Box 273, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 273

WANTED.—I am seeking a gilt-edged investment in some first-class telephone property. Not particular as to location, but must be shown before I buy. Address, Box 269, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 269

CORDS AND CABLES

We manufacture Switch-board Cables; also, Cables for interior work, and Cords of every description used in conjunction with telephone work.
WRITE US FOR PRICES.

Runzel-Lenz Electric Mfg. Co.
97-101 So. Clinton St., CHICAGO

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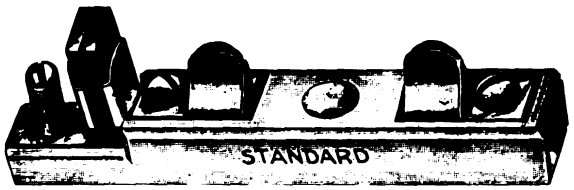

No. 42, Price 10c. each

Special Prices in Quantities
Write for Complete Catalog

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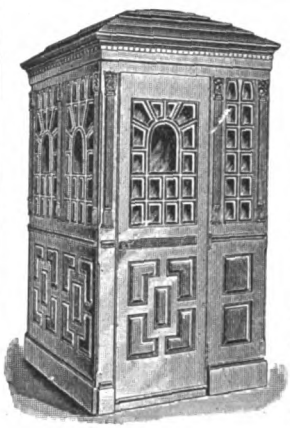
62 N. Van Buren Street " " CHICAGO, ILLINOIS



A poor booth is worse than none at all. Our

BOOTHS

are superior in every way. Keep more outside noise out, and more inside talk in than any others. It's because we know how to make them right. Experience taught us.
Write now for description and prices.

W. S. SEAMAN & CO.
216 Water Street, MILWAUKEE, WIS.

EXPANDED METAL LOCKERS.

LOCKERS

Open Mesh or Solid Sheet Steel Clothes Lockers and Material Closets made by us have all the best improvements and advantages

MERRITT & CO.
1010 Ridge Av., PHILA.

Please send a { Catalogue / Sample of Metal
To_____

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which is otherwise required to distinguish the call for central from other rings. In the Ericsson system when central is wanted the drop indicates it just as on an individual line, and this is accomplished without grounding one side of the metallic circuit, as is usually done in other systems, thereby making the line unbal-

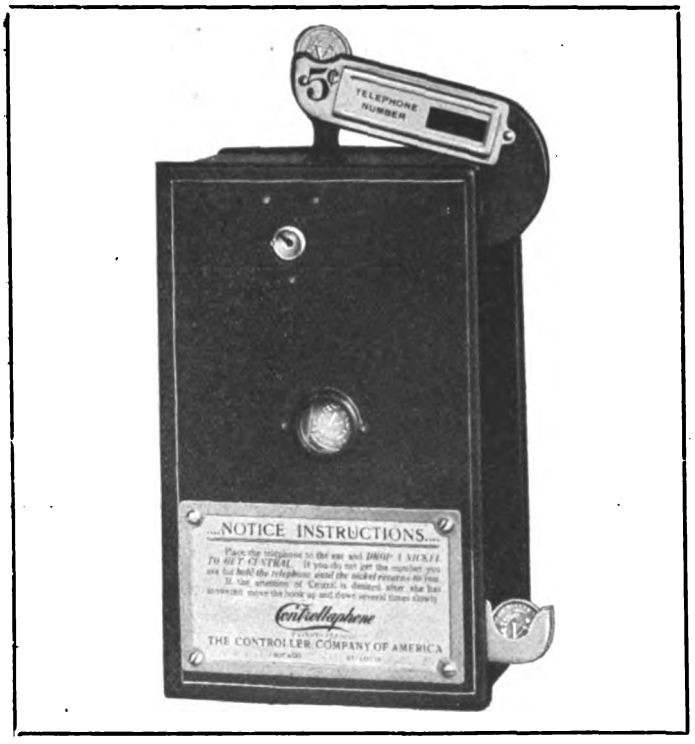

Fig. 2. Stroud Controller.

anced and noisy. With the Ericsson devices the line remains perfectly balanced in relation to ground under all circumstance and all the subscriber has to do to call central is to press a button or strap key. When the subscriber calls other subscribers the calling is done in the usual manner with the individual signals and central is not disturbed. Precisely the same results are accomplished on common return and grounded lines, and the system is so simple and saves so much annoyance to the operator, that every exchange having such rural lines entering their switchboard should know about this system, and consider adopting it.

We suggest to our readers to correspond with the Ericsson Telephone Company, No. 296 Broadway, New York City, regarding the system.

THE BAIRD MANUFACTURING COMPANY has received a letter during the past week from a prominent telephone company from which the following is a quotation: "Will you please send us your latest catalogue of pay-station boxes, and most particularly as to the single 5c. box. We have bought quite a number of this type of box from the ——— company, but are frank to admit that we do not like them quite as well as your boxes."

NEW TYPES OF "CONTROLLERS."

"A MACHINE that won't let the telephone talk until you put in a nickle." This is the definition of the latest type of telephone coin devices made by the Controller Company of America, given by an Iowa telephone man. While it is not so short as "Controller" or "Controllaphone," the names bestowed by the Controller Company on its apparatus, the Iowa gentleman's definition is certainly descriptive and to the point.

The Controller's Company's newest type of "Controllaphone" is pictured in Fig. 1, and is known to the trade as No. 6. They call this the "Educational Set" for reasons which are given in their new bulletin No. 6, just issued. This bulletin will be sent to any telephone company or officer thereof for the asking, and should be had by every company operating on a measured service basis, or contemplating such a departure from flat rate service.

The "Educational Set" is a combination of wall telephone set, and slot machine, being designed to meet the demand for a compact coin service set. It consists of the Stroud Controller mounted on a pressed steel backboard. The extreme dimensions of the set are 5½ inches by 11 inches. A well-made self-contained hook switch is fastened to the base, extending out so as to hold the receiver in the ordinary manner. Just below the "Controller," on an extension of the base an adjustable transmitter arm is mounted. Any standard make of receiver and transmitter may be attached to this set.

No part of the containing case or base forms any part of the circuit, and there are no binding posts or terminals exposed.

The Stroud Controller shown in Fig. 2 is the center focus of the Controller Company's apparatus. It is known as No. 1, and is used by many of the largest Independent companies. The main principle of this controller is that the central operator can-

Fig. 1. Controller Co.'s Educational Set.

not be signaled until a nickel or a token in case service is less than five cents is deposited in the top slot as shown in the illustration. The act of dropping a nickle in this slot, with the receiver off the hook, signals the operator. in case the party wanted is busy or does not answer, the operator causes the nickle to be

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CONTINUED ON PAGE 36.

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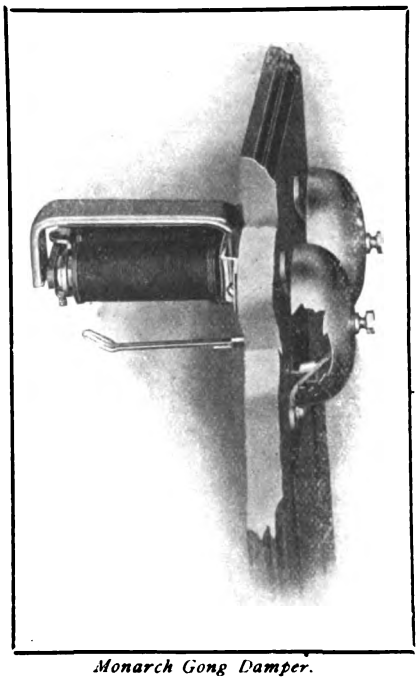
returned to the party calling. A nickle is thus shown in the bottom slot. The operator's time is not taken up by her having to ask the party to drop in the nickle, nor does she have to wait while the party makes change. The subscriber has to do all this before he gets the operator. The Controller Company, with general offices at 1060 Monadnock Block, Chicago, will be glad to mail their series of instructive bulletins to any one sending a request.

THE MONARCH GONG DAMPER.

THE Monarch Telephone Manufacturing Company has recently added a new feature to its compact telephone, which will be appreciated by both exchange men and subscribers. Almost every one using this common type of telephones has experienced the annoyance caused by the continued vibration of the ringer gongs after the receiver has been placed to the ear. The sensitive transmitters manufactured to-day take up the vibrations and magnify the mto such an extent that conversation is impossible until the noise is stopped. It is usually the custom to place the hand on the gongs to deaden the tone, but the device of the Monarch Company make this unnecessary.

The accompanying cut shows the means of stopping the vibrations. As will be seen, a lever is fastened by hinges on the door of the telephone just below the ringer. When the door is closed, this lever rests upon the switch hood so that the raising of the hook also raises the lever. Two prongs or forks of the lever extend through the door, one into the inside of each gong, and are equipped with leather discs on their ends. These discs are normally held away from the gongs, but the tilting of the lever by the removal of the receiver throws them down into contact with the metal and effectually stops further vibrations.



Monarch Gong Damper.

A patent has been granted to the Monarch Company on this device, and they are installing it in all of their compact telephones. No extra charge is made, notwithstanding the advantages derived, as it is the policy of this company to make their telephones as efficient and up-to-date as it is possible to produce them. A more complete description of this gong damper will be found in a bulletin now being prepared.

A NEW CROSS-ARM COMBINATION.

MR. J. S. BOGGS, of Albany, Ga., the well-known manufacturer of Georgia Yellow Pine Cross-Arms, has effected a working combination with the Waymer-Moore Company, of Jacksonville, Fla. The latter company are also well-known cross-arm manufacturers. Under the new agreement Mr. Boggs will act as sales agent for the Waymer-Moore Company. This makes a very strong combination, and insures that all customers will receive prompt shipments as well as lowest possible price and the best cross-arms. An enormous tock will always be on hand. The motto of the new combination will be to do everything possible to please customers. We would call aur readers attention to Mr. Bogg's announcement in the advertising pages of this section, and also advise them to communicate with him when in the market for arms.

WILL HANDLE TELEPHONE SECURRITIES.

AT last the Independent telephone field is to have a reliable and influential medium for marketing its securities, and for negotiating its various financial deals.

At Chicago during the morth of October a new concern was organized under the name of the Independent Telephone Syndicate, which will afford facilities hitherto lacking, for the promotion and financing of all legitimate propositions in this field. Undoubtedly, the new organization should prove of great benefit in the Independent field where many unusual opportunities for investment exist.

The Independent Telephone Syndicate will list and market telephone securities, buy and sell telephone properties, and effect transfers of mutual benefit to the parties interested.

One of the most serious handicaps of the Independent field thus far has been the fact that it has lacked proper facilities for buying, selling, building and promoting. The field, already large and lucrative,, has demonstrated that still further steady increase may be expected of it, and that it will prove of a permanent character. With this kind of a field, and with the advantages which the new firm will enjoy in the way of experience, means and influence, it should not only prove of great service to its patrons, but be successful from the start.

In this organization are found some of Chicago's leading business men, who enjoy both capital and wide experience in telephone and financial aflairs.

Offices have been opened on the seventh floor of the Great Northern Building, No. 708, in the heart of Chicago's business district, where all callers and inquiries will be courteously received by Mr. J. H. Duryee, who was for eighteen years connected with the Prairie State Bank of Chicago.

THE CENTURY TELEPHONE CONSTRUCTION CO., of Buffalo, N. Y., is building a new switchboard for the Lowville, N. Y., exchange of the Black River Telephone Company. It has been completed five common battery equipments for exchanges of the Livingston County Telephone Company, Livingston, N. Y., and also a common battery equipment for the Holley Telephone Company, Holley, N. Y.

THE L. B. ALLEN COMPANY, INC., of Chicago, maker of the Allen Soldering stick, is sending to the trade several mailing cards, folders and booklets, giving interesting facts concerning its prduct. In one of these the company soys:

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With each sample of solder the company mails a neat folding foot rule.

THE CENTURY TELEPHONE CONSTRUCTION CO., Buffalo, N. Y., has received orders for two magneto switchboards from the Citizens Telephone Company, Watertown, N. Y.

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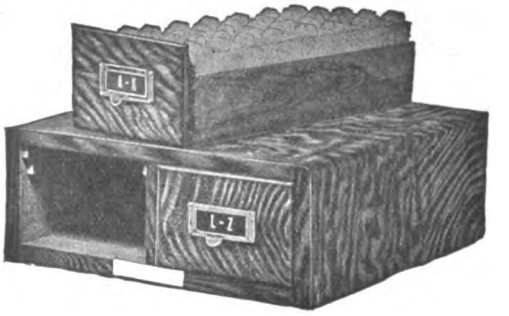

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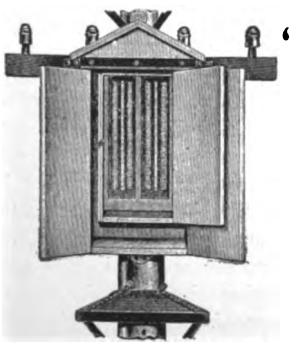

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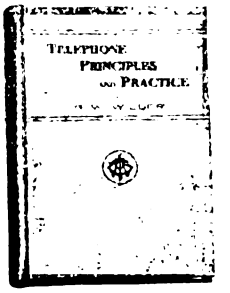

By G. W. WILDER, Ph.D.,
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VIII.	The Telephone Receiver.	XXIII.	Common Battery Systems
IX.	The Transmitter.	XXIV.	Selective Party Lines.
X.	Induction.	XXV.	Location of Exchanges and Pole Lines.
XI.	The Induction Coil.	XXVI.	Poles.
XII.	The Magneto Generator.	XXVII.	Wire.
XIII.	Ringers.	XXVIII.	Construction of a Wire Plant.
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TELEPHONE PATENTS

AN IMPROVED HOOKSWITCH FOR TELEPHONE DESK SETS.

K. Weman, New York, N. Y., patents (No. 771,343) an improved hookswitch for telephone desk sets. The essential features of this invention are shown in the illustration (Figs. 1 and 2), from which it appears that the inventor provides a very compact set of springs *T S M L P*, which are contained in the top of

Fig. 1.

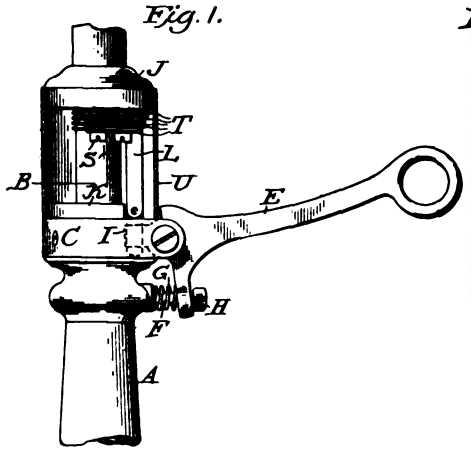
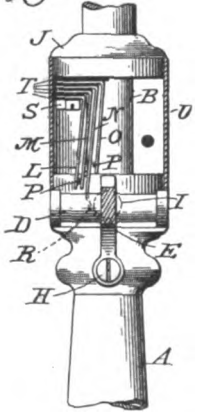


Fig. 2.



the transmitter stand and covered by means of the casing *U*, which is easily removal to permit of inspection and repair. The springs are operated by means of the lever hook *E*, which is pivoted at *G*.

AN IMPROVED MICROPHONIC CAPSULE.

E. B. Fahnestock, New York, patents (No. 771,135) an improved microphonic capsule. The object of this invention is to provide an improved method of constructing and using microphones in telephone transmitters. The general appearance of this invention is shown in the accompanying illustration. The inventor provides a block 5 which may be of metal or other convenient of the microphone, as is shown in the section. There are two

Fig. 1

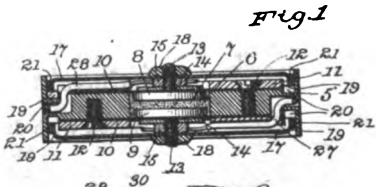
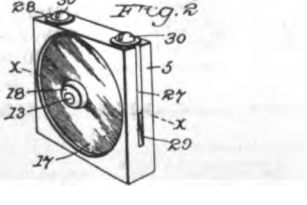


Fig. 2

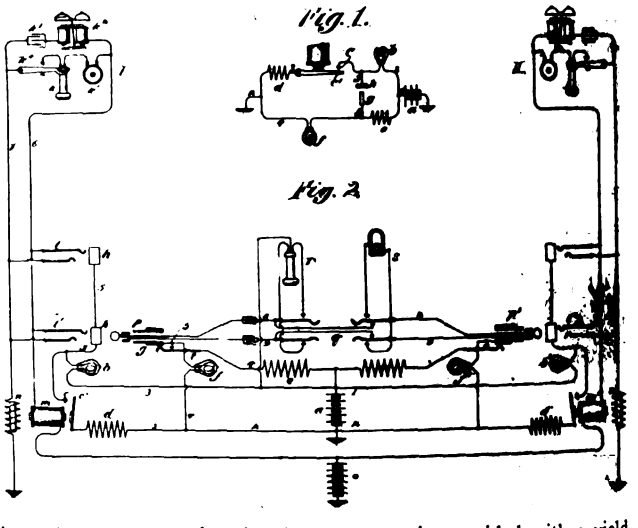


substance. This block is recessed to contain the working parts electrodes *13*, which are secured to diaphragms *17* by means of the nuts *81*, from which it will be seen that this invention belongs to the double diaphragm order. The granular carbon *7* is contained between the electrodes *13*. The essence of the invention consists in the fact that the block containing the microphone is hollowed out, as shown at *19*, so that the diaphragms touch nothing but the studs of the electrodes. The edges of the diaphragms are dished, as shown at *19*, and after being secured in place upon the studs *13* a little rubber cement is poured around the circumference of each one, thus holding the diaphragm in place by means of a flexible material.

MEASURED SERVICE SYSTEM.

F. R. McBerty, of Evanston, Ill., and J. L. McQuarrie, of South Orange, N. J., patent (No. 771,996) an improved measured service system and assigned to the Western Electric Company. This invention relates to measured service systems in which the recording apparatus is located at the substation, and so arranged that in case the subscriber does not obtain his connection, he is enabled to rebate the charge. The circuit employed is shown in Fig. 1, and a general view of the apparatus in Fig. 2. From Fig. 2 it is seen that the meter consists of a metallic box carrying a set of dials which record the number of calls and and indicator which shows whether the message is charged or not, and a crank whereby under certain conditions the subscriber is enabled to rebate the call. This invention is best understood from a description of its operation. Fig. 1 represents the circuit of a four party line in which *S1*, *S2*, *S3* and *S4* are respective apparatus. *S3* is shown in detail, the other substations diagrammatically, but it is understood that each substation is supplied with the same apparatus as shown for *S3*. The exchange is called in the usual manner by removing the receiver from the hook. If the line is busy at some other station, the test relay *L* is excited, disconnects the branch 5 containing the service meter, and therefore the subscriber is not charged with the call. If the line is free, the circuit 765 is completed, the magnet *m* of the service meter is excited by current from battery *b*. This magnet is a peculiar one, known as a

Fig. 1.



two-step magnet; that is, the armature is provided with a yielding spring that actuates the stop *u*. When battery is connected to the line, a certain current flows, exciting the magnet to pull the armature up one step. The key *f* is provided with a generator *g* giving a higher potential, say 110 volts. When the operator touches the key, this additional pressure excites the magnet *M* and causes its armature to make the second stop. The first step of the armature releases the charge-shutter *p*, which drops and indicates that the meter has provisionally registered the charge. The shutter closes the contacts *q q'* and the armature the contacts *z z'*, whereby the circuit *10* from lever *y* to earth through magnet *m* is completed through both the parallel branches and a locking circuit for the magnet through path *10* independently of the telephone switch. If the central office does not answer, the subscriber may restore the normal condition of the apparatus by pulling the rebate lever *w*. This lifts the shutter *p*, opening the contacts *q* and *q'* and operates the transmitter switch *y*, shifting the connection of the branch containing the magnet to conductor *2*, which is normally open. The locking circuit of the magnet being broken, its armature falls back, opening contacts *z z'*, allowing the shutter to be latched by detent *r*. If the operator responds by plugging into the spring jack, the battery *b* is reversed and the subscriber is prevented from rebating the charge as long as the connection is up at the central office. If the operator finds that connection cannot be given, she will tell the calling subscriber to hang up his receiver and work the rebate lever.

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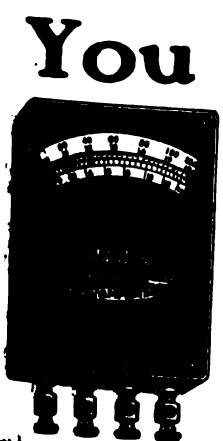
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THE WEEK'S MESSAGES

FINANCIAL.

ANDERSON, IND.—The Delaware & Madison County Telephone Company has declared a six months' dividend of 1½ per cent.

MOUNT ZION, IND.—The Mount Zion Telephone Company has increased its capital stock from $8,000 to $20,000.

FRANCHISES.

AMHERSTBURG, CANADA.—The town council has granted the Ontario Independent Telephone Company a franchise. The company will immediately begin the construction of a plant in this town.

MATTOON, ILL.—The Mattoon Telephone Company has asked the city council for an extension of its franchise.

MAYSVILLE, KY.—The Maysville Telephone Company has purchased a franchise sold at auction October 22d for a period of 20 years to construct and operate telephone lines along all public roads, turnpikes and under navigable waters in Mason County, Ky.

ERICK, OKLA.—L. M. Brooks has been granted a franchise to put in a telephone system here.

CAMERON, W. VA.—The Carmel Telephone Company has applied for a franchise in this town.

ELECTIONS.

JACKSONVILLE, ILL.—At the annual meeting of the directors of the Illinois Telephone Company, the following officers were elected: E. P. Kirby, president; A. L. French, vice-president; E. S. Greenleaf, treasurer; R. A. Gates, secretary-auditor; C. F. Tonn, general manager.

NEW LONDON, IA.—The stockholders of the Henry County Telephone Company have elected directors as follows: J. L. Portlock, Green Lee, T. T. Laughlin, W. J. Franey, Frank Smith, J. E. Peterson, J. T. Whiting.

CARTHAGE, MO.—The stockholders of the Home Telephone Company at their annual meeting elected the following directors: W. H. Warren, John Scovern, Theodore Gary, H. E. Scovern and John W. Layne.

BUFFALO, N. Y.—At the recent annual meeting of the Frontier Telephone company the following officers were elected: H. H. Persons, president; E. C. Lufkins, first vice-president; E. S. Wayland, of Scranton, second vice-president; S. L. Mesmer, treasurer, and John Jolly, secretary.

COMBINATIONS.

HUNSTVILLE, ALA.—The principal stockholders of the Girley and New Hope Telephone Company have purchased the property of the Huntsville, Guntersville and Gadsden Telephone Company and will merge the two systems.

LITTLE FALLS, N. Y.—Irving H. Griswold, representing the Home Telephone Company of Albany, Troy, Schenectady and Cohoes has purchased controlling interest in the Interstate Telephone Company of this city.

NORRISTOWN, PA.—The Consolidated Telephone Company has entered into negotiations for the sale of its plant to the United States Telephone Company.

NEW COMPANY NOTES.

WASHINGTON, D. C.—Articles of incorporation have been filed with the county clerk for the State Mutual Telephone Company with a capital stock of $50,000. The incorporators are A. D. Weller, T. J. Gray, T. B. Lee, Frank R. Hollingshead, E. M. Route, J. Dan Blackistone, and A. J. Bette.

COCOA, FLA.—The Brevard Telephone Company has been incorporated with a capital stock of $5,000 by H. S. Williams, J. Paxton, H. S. Hardee, L. S. Jones and R. N. Andrews.

KEITHSBURG, ILL.—An Independent telephone company is being organized here, particularly to secure connection with outlined communities and other Mercer County towns.

INDIANAPOLIS, IND.—The National Telephone & Telegraph Company of Wheeling, West Virginia, has been incorporated under the laws of the State of Indiana with a capital stock of $250,000, $175,000 of which is invested in Indiana. The president is H. C. Paul.

PETERSON, IOWA.—The Spring Brook Rural Telephone Company with post office address at Peterson has been incorporated with a capital stock of $1,000. The board of directors are: C. H. Felton, George L. Keene, Albert Clark, Charles Mohrer, William C. Mueller, Fred Roggow and Henry Miller. The officers are: Henry Miller, president; Theodore Roths, vice-president; Fred Roggow, secretary, and Henry Stier, treasurer.

SUTHERLAND, IOWA.—The Gaza and Sutherland Telephone Company has been incorporated with a capital stock of $600. The board of directors are: J. J. Short, H. E. Kaiser, B. F. Miller and Frank Tierney and Frank Dabric.

WAVERLY, IOWA.—J. W. Bang and C. H. Barrows have organized two rural telephone companies, one the La Fayette Rural Telephone Line, of which J. B. Baker is president, and J. W. Wilkin secretary and treasurer. The other the Washington Rural Telephone Line, F. C. Meyer president, and S. M. Lehman, secretary and treasurer.

ELLSWORTH, KAS.—The Lyons Telephone Company has been incorporated with a capital of $12,000 to give telephone service to the town of Lyons, Kan. C. F. Pohlman, Ellsworth, president; W. D. Jellison, Wilson, vice-president; M. L. Meek, Ellsworth, secretary; G. T. Tremble, Ellsworth, treasurer, and H. N. Williams, manager, Lyons, Kansas.

PEKIN, KAS.—The Pekin Telephone Company has been incorporated with a capital of $4,500.

EASTBROOK, ME.—The Eastbrook Telephone Company has been incorporated with a capital stock of $2,000. President, S. S. DeBeck, of Franklin; treasurer, R. B. Lawrie, of Eastbrook.

MANCHESTER, MASS.—The Woodland Telephone Company has been incorporated with a capital stock of $10,000 by H. E. Emery, J. T. Collins, of Manchester, and F. S. Collins, of West Gardiner.

DETROIT, MICH.—Charles E. Chaney, James A. Forrestor and Chas. W. Taylor, of Detroit, have incorporated the Shore Line Telephone Company with a capital stock of $50,000.

NEWTON, MICH.—The Newton & Leroy Telephone Company has been organized to build farmers' lines in the two above-named townships. The principal stockholders of the company are E. C. Corey, J. A. Hurd, Henry Randt, H. W. Flanders, C. D. Spooner.

SWEET SPINGS, MO.—The Sweet Springs Telephone Company has been incorporated with a capital stock of $20,000 by B. H. Dickson, R. S. Hays, C. K. Smith and others.

MEDFORD, OKLA.—The Medford Telephone Company has been incorporated with a capital stock of $3,000 by D. L. Cline, J. Sharp and W. S. Long, all of Medford.

WILLAMETTE, ORE.—The West Oregon Telephone Company of Willamette has been incorporated with a capital stock of $2,000 by Charles Baker, G. P. Gros and E. S. Kruse.

LUMBER CITY, PA.—The Lumber City Rural Telephone Company has been organized with the following officers: C. S. Kirk, president; Dorsey Hill, secretary, and Dr. H. Woodside, treasurer. Executive committee: D. H. Watts, J. M. Krebs and Harrison Straw.

PERRYSVILLE, PA.—The Perrysville Telephone Company has been organized for the purpose of operating a telephone line between Genesee, New York and West Bingham, Pa.

UNIONTOWN, PA.—The Bruceton & Fairchance Telephone Company has been incorporated with a capital stock of $100,000. The officers are: J. H. Walls, of Brockville, West Virginia, president, and George B. Irvin, of Fairchance, vice-president.

STORLA, S. D.—A telephone company has been organized by farmers residing in this vicinity. Four lines will be constructed with the central office located here.

PERSONAL.

FRANK CRIPPEN has been appointed manager of the Mutual Telephone Company's system at Alpena, Mich.

H. NELTHORPE has been appointed wire chief for the Wisconsin Telephone Company at Kenosha.

A. JACOBI has been appointed county manager of the Sunset Co.'s system in Alameda County, Cal.

ALEX. WILLIAMS has been appointed general manager of the Minnesota Central Telephone Company.

J. A. WRIGHT has taken charge of the mechanical department of the Home Telephone Company at Thornton.

MISCELLANEOUS.

LOS ANGELES, CAL.—A. B. Benton is preparing plans for the telephone exchange of the Home Telephone Company at Redlands. The building will be 40 x 100 and thoroughly fire-proof.

QUINCY, ILL.—Samuel G. McMeen, of the firm of McMeen and Miller, consulting engineers, of Chicago, has opened an office here to look after the engineering work of the new Independent telephone system.

CHANDLER, IND.—The Chandler Telephone Company, which was recently incorporated with a capital stock of $2,500, will build a local exchange and operate telephone lines throughout the country. The chief organizers of the company are: W. M. Gardiner, W. M. Cosler and J. W. Webb.

DES MOINES, IA.—J. Sebastian, of the Rock Island Railroad, is endeavoring to have a telephone factory moved to this city.

GRAND RAPIDS, MICH.—Alexander W. Macrae, warden of the city and county of St. Johns, New Brunswick, visited this city to inspect the plant of the Citizens' Telephone Company with a view to securing data to present to the home municipality, as a movement is on foot in St. Johns to install a municipal telephone plant.

HUTCHINSON, MINN.—The Hutchinson Telephone Exchange Co. has distributed a new directory which contains the names of 294 local subscribers, 111 subscribers on farmer rural lines, and nine toll stations

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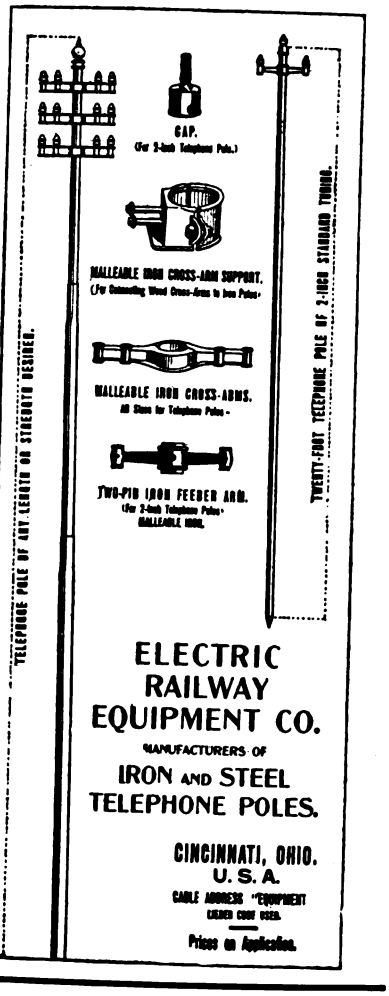

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owned by the company outside this city. The company has had a new commissariat wagon built to take the place of the one destroyed by a cyclone in August.

MANKATO, MINN.—The Minnesota Valley Telephone Company has made connections with Worthington and Windom, giving connection with Sioux Falls, Heron Lake, Brewster and other points via the Minnesota Valley.

JEFFERSON CITY, MO.—The case of the State against the Missouri & Kansas Telephone Co., to compel a reduction of the telephone charges, on the Bell system in Kansas City, has been postponed to the April term of the Supreme Court.

GENEVA, NEB.—In the recent fire in this city the central office of the Fillmore County Telephone Co. was badly damaged.

HATTON, N. D.—A fire disabled the telephone exchange.

PHILADELPHIA, PA.—The annual report of the secretary of internal affairs regarding telephone companies incorporated in the State of Pennsylvania for 1903 shows 87 companies, of which 78 are Independent concerns and nine Bell organizations. The total number of Independent telephones in use by 72 companies is 62,077, the investment being $19,839,045 or an average investment of $320 per telephone.

WAYNESBORO, PA.—The Pennsylvania Telephone Company has submitted a proposition to lease its system in the city to Waynesboro capitalists.

FORT WORTH, TEXAS.—A plan is now on foot to consolidate the Independent telephone exchanges of Brownwood, Ballinger, San Angelo, Paint Rock, Eden, Menardville, Coleman and possibly Abilene, Sweet Water and Colorado. The matter has not yet crystallized into definite shape.

SAN AUGUSTINE, TEX.—The Sabine Valley Telephone Company will soon move into its new building. A new switchboard is being installed.

UNDERGROUND.

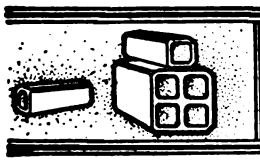
LOS ANGELES, CAL.—The city council is making arrangements to have the underground telephone and telegraph wire district enlarged and to see that all of the companies put the wires underground in that district.

WATERBURY, CONN.—The Southern New England Telephone Company (Bell) will shortly begin the work of constructing 30,000 feet of underground conduits in Waterbury.

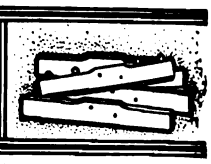
AURORA, ILL.—The Northern Illinois Telephone Company is laying a number of its cables underground.

LA PORTE, IND.—The La Porte Home Telephone Company intends to place all of its wires in the down-town districts underground and in time to extend the same to the residence districts. The company expects to put 10,000 feet underground this fall.

CHESTER, PA.—The telephone and telegraph wires in this city will be placed underground.



New Construction in the Field



NORTH BIRMINGHAM, ALA.—The new telephone system of the People's Home Telephone Company has been completed and all the telephones installed.

MILLIDGEVILLE, GA.—The Central Georgia Telephone Company has completed a long distance line to Eatonton.

STERLING, ILL.—The Interstate Telephone Company is building a line from this city to Rock Island.

WEST BURLINGTON, IA.—The Burlington Rural Telephone Company is adding a large number of new subscribers to its system in this vicinity.

HARRIS, KAN.—The Harris Telephone Company is building several additional miles of rural lines, besides a toll line to Amiot.

OTTAWA, KAN.—A toll line is being built to connect this town with Kansas City.

PLYMOUTH, KAN.—The Plymouth Farmers Telephone Company is building a line to Magda.

RISING SUN, MD.—The work has commenced on the Cecil Farmers Telephone Company.

SOUTH ASHFIELD, MASS.—The Heath Telephone line is to be extended to this village.

CADILLAC, MICH.—The Citizens' Telephone Company has decided to extend its lines to Meauwataka, Boon and Henrietta. Construction work will be started shortly and it is expected that the system will be in operation in three villages before the first of next year. A large number of farmers' lines will be installed.

ALBERT LEA, MINN.—The Alden Telephone Company is making a number of extensions to its system in this vicinity.

ANOKA, MINN.—The Northwestern Telephone Exchange Company is installing a cable system.

BELGRADE, MINN.—Work on the Game Lake Telephone line will be begun this week.

BYGLAND, MINN.—A telephone line is being built through here.

IVANHOE, MINN.—The Lincoln County Telephone Company has completed its line from Hendricks to Ivanhoe and work is now commenced on the Ivanhoe exchange.

LERDAL, MINN.—The Lerdal Telephone Company's line is being put up with great rapidity.

MANKATO, MINN.—The Minnesota Valley Telephone Company is making a number of extensions to its system.

STANCHFIELD, MINN.—The Northwestern Telephone Company is putting a new line in from Stanchfield to Maple Ridge, via Elm Park.

WATSON, MINN.—The Citizens Telephone Company is putting in new telephones in some of the business places. It is the intention of the company to extend so as to make a regular telephone system of it.

BOSTWICK, NEB.—The Red Line Telephone Company is putting telephones in in this vicinity.

HUMBOLDT, NEB.—The local telephone company has installed a new aerial cable to take care of its increased business.

EGG HARBOR, N. J.—Ten miles of telephone line will be built from Egg Harbor to Green Bank.

WINDSOR, N. J.—The Farmers and Traders Telephone Company will construct telephone lines in this vicinity.

GAINESVILLE, N. Y.—The new telephone system, which will connect this place with the village of Castile and Silver Springs, is nearing completion. The exchange will start work with about 125 subscribers and represents a total investment of about $15,000. The principal organizers of the company are H. A. Pierce, M. N. Cole, A. B. Windsor.

NEW LISBON, N. Y.—The New Lisbon Farmers Telephone Company is extending its system and will install about 20 new telephones.

PROSPECT, N. Y.—The West Canada line is being extended to Remsen.

UNION, N. Y.—The Main & Union Telephone Exchange has arranged for the construction of a local exchange. It has also arranged for the extension of lines to Vestal and Endicott in the near future.

BIRDSBORO, PA.—The Conestoga Mutual Telephone Company, which was organized among the farmers of Conestoga Valley and this vicinity about a year ago, is branching out and extending its lines into competitive territory. It has connections with Birdsboro, and has a toll agreement with the Independent Company. At present it is extending the line to Pottstown and Reading.

Butler, Pa.—F. Neal, of Kittanning, is securing rights of way for the Butler & Coylesville and Kittanning telephone line, which is to be built to Butler via Coylesville, and will be a feeder of a new line into Pittsburg.

CONNELLSVILLE, PA.—The Tri-State Telephone Company has opened connection with the Pittsburg & Johnstown Long Distance Telephone Company, giving service with Greensburg. The local company has completed its Flatwoods line and work is progressing on the line from Union to Cheat Haven, connecting with the Point Marion Company and giving a direct circuit to Morganstown. The new line to Waltersburg, Smock and Keister will be put in operation shortly.

ECONOMY, PA.—The Economy Telephone Company will install lines in Berlin and Somerset.

FALLS CREEK, PA.—The Elk Telephone Company is building a line to this city to connect with the Summerville system.

READING, PA.—Work on the Consolidated Telephone Company's trunk line has been completed as far as Womelsdorf and it is expected that communication with Lebanon and the west will be effected by the beginning of next week.

HIGHMORE, S. D.—W. N. Curtis, of Milton, Iowa, has been engaged by the Hyde County Telephone Company to install their new exchange.

IONA, S. D.—A line is being constructed from Bonesteel to the new town of Gregory giving connections with this town.

ALVIA, TEX.—The Alvia & Angleton Telephone Company is arranging to extend its lines to Friendswood. This will add about 15 new telephones to the present system.

CALDWELL, TEX.—Work has commenced on the extension of the telephone line from Cooks Point to Rita in the extreme northern part of the county. This gives Caldwell connection with every section of the county.

FALFURRIAS, TEX.—Telephone service will be established between Alice and Falfurrias and probably the larger ranches in the surrounding country as soon as possible.

BELLAIRE, W. VA.—The Bellaire Telephone Company is contemplating a number of extensions which it will put through in the near future.

ONO, WIS.—Work on the Farmers' Telephone line between here and Maiden Rock is being pushed right along.

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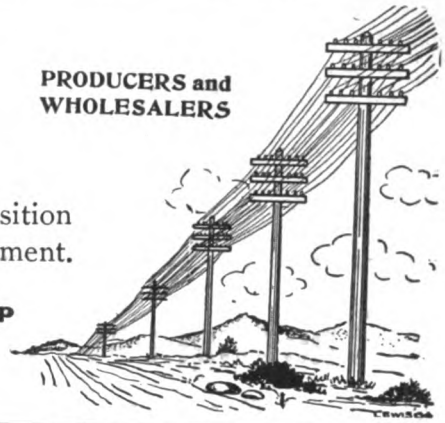

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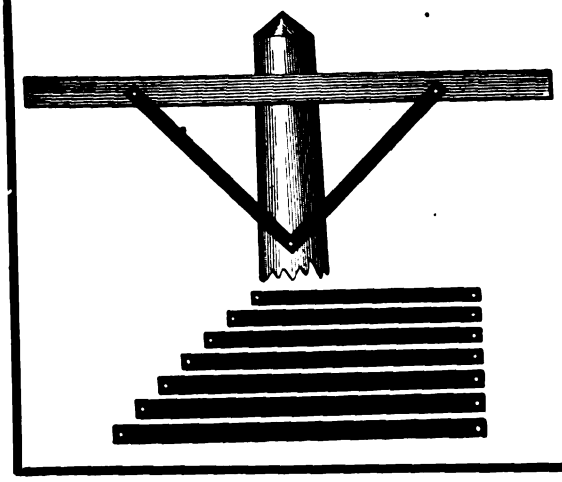

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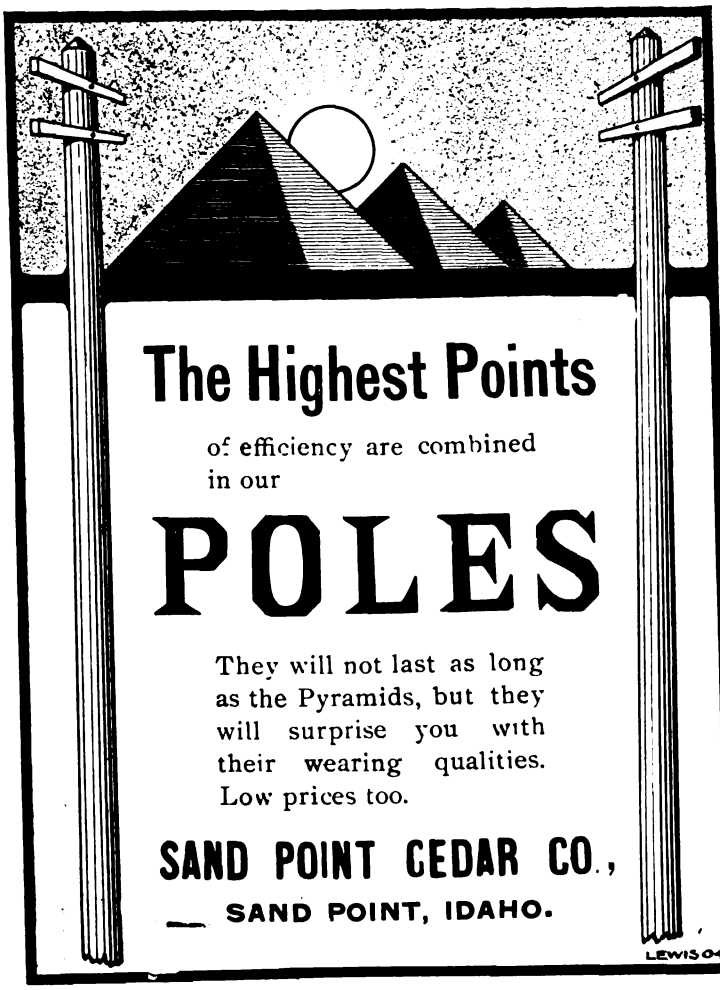

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Farr Tel. & Const. Supply Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Monarch Tel. Mfg. Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.
Swedish-American Tel. Co., Chicago, Ill.
Vought-Berger Co., La Crosse, Wis.

TELEPHONES.
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Andrae, Julius & Sons Co., Milwaukee, Wis.
Century Telephone Const. Co., Buffalo, N. Y.
Chicago Writing Machine Co., Chicago, Ill.
Connecticut Telephone & Electric Co., Meriden, Conn.
Couch, S. H., Co., Boston, Mass.
Eastern Tel. Mfg. Co., W. Chester, Pa.
Electric Appliance Co., Chicago, Ill.
Ericsson Tel. Co., N. Y.
Farr Tel. & Const. Supply Co., Chicago, Ill.
Guarantee Teleph. & Equipment Co., Chicago, Ill.
Hipwell Mfg. Co., Allegheny, Pa.
International Telephone Mfg. Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Monarch Tel. Mfg. Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.
Swedish-American Tel. Co., Chicago, Ill.
Vought-Berger Co., La Crosse, Wis.

TELEPHONE BLANKS.
Telephone Printing Co., Defiance, Ohio.

TELEPHONE BOOKS.
Cantwell Printing Co., Madison, Wis.

TELEPHONE BOOTHS.
Seaman, W. S., & Co., Milwaukee, Wis.
Yesbera Manufacturing Co., Toledo, Ohio.

TELEPHONE HOLDER.
Chicago Writing Machine Co., Chicago, Ill.

TELEPHONE SUPPLIES.
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Baird Mfg. Co., Chicago, Ill.
Barr, W. J., Mfg. Co., Cleveland, Ohio.
Bissell Co., The F., Toledo, O.
Century Telephone Const. Co., Buffalo, N. Y.
Chicago Writing Machine Co., Chicago, Ill.
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Couch, S. H., Co., Boston, Mass.
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Hipwell Mfg. Co., Allegheny, Pa.
Hubbard & Co., Pittsburg, Pa.
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Kellogg Switchboard & Supply Co., Chicago, Ill.
Measured Service Co., Chicago, Ill.
Monarch Tel. Mfg. Co., Chicago, Ill.
Morris Electric Co., Wilmington, Del.
Mountain State Electric Co., Wheeling, W. Va.
Nagel, W. G., Electric Co., Toledo, O.
Seaman, W. S., & Co., Milwaukee, Wis.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.
Swedish-American Tel. Co., Chicago, Ill.
Vought-Berger Co., La Crosse, Wis.
Yesbera Mfg. Co., Toledo, O.

TERMINALS.
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Cook, Frank B., Chicago, Ill.
Harvard Electric Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
McIntire Co., C., Newark, N. J.
Mountain State Electric Co., Wheeling, W. Va.
Nagel, W. G., Electric Co., Toledo, O.
Sterling Electric Co., Lafayette, Ind.

TESTING CLIP.
Frankel Fixture Co., New York City.

TOLL TICKETS.
Telephone Printing Co., Defiance, Ohio.

TRANSMITTER ARMS.
Barr, W. J., Mfg. Co., Cleveland, Ohio.

WIRE.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Chicago Insulated Wire Co., Chicago, Ill.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
National Wire Corporation, New Haven, Conn.
Okonite Co., New York.
Roebling's Sons Co., John A., Trenton, N. J.
Runzel-Lenz Electric Mfg. Co., Chicago, Ill.
Standard Underground Cable Co., Pittsburg, Pa.

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Telephone Wire

Every bundle of **Wire** bearing tin tags and lead seals as shown by these photographs is

Guaranteed the Best

and will invariably pass the specifications of the largest telegraph and telephone companies.

The National Wire Corporation

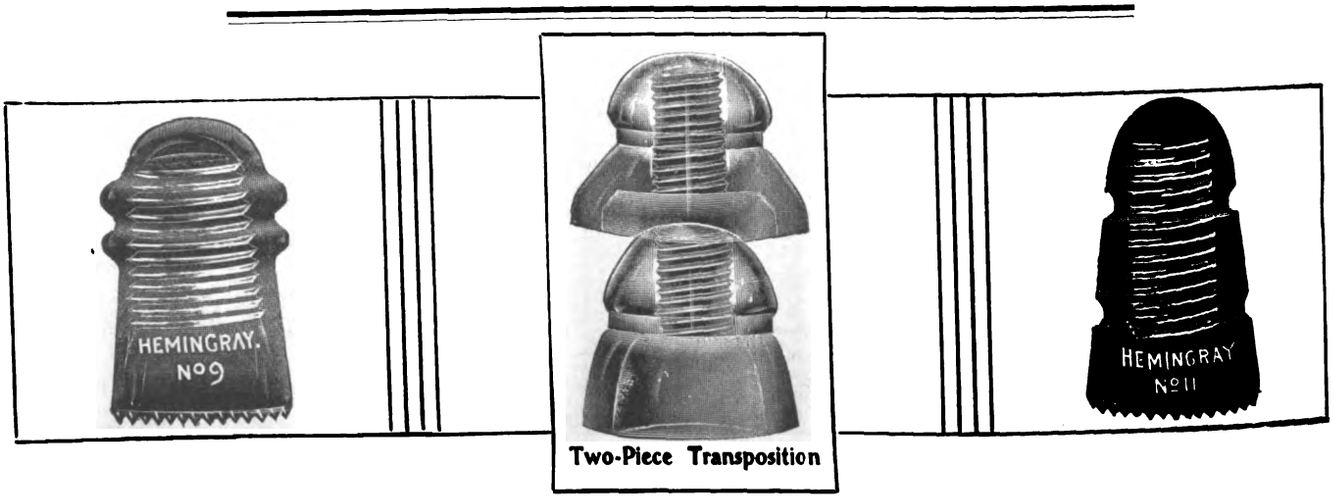
General Offices: Engineering Building, 114 & 116 Liberty St., NEW YORK.

Works: NEW HAVEN, Conn.

Sales Offices and Warehouses: New York, Chicago, Boston, Dekalb, Kansas City, New Haven, San Francisco

THE STANDARD "HEMINGRAY"

ALL WITH THE "PATENT DRIP PETTICOATS."



Two-Piece Transposition

THE HEMINGRAY-GLASS CO.

Office, Covington, Ky. **Factory, Muncie, Ind.**

ESTABLISHED 1848.

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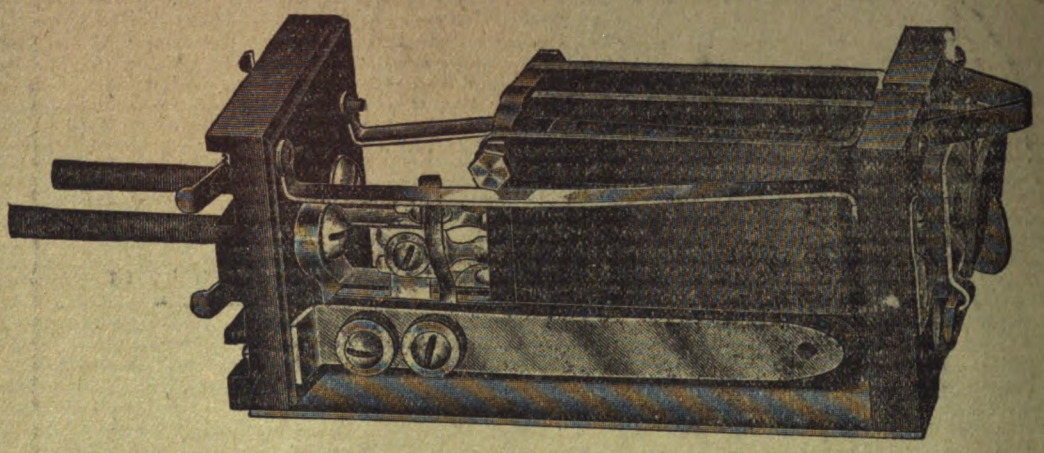
IMPROVED AMERICAN EXPRESS SWITCHBOARDS

BETTER THAN EVER



Manufactured under Patent Nos.

617,691
617,692
618,610
617,702
620,491
624,075
625,797
669,094
674,402
692,895
579,239

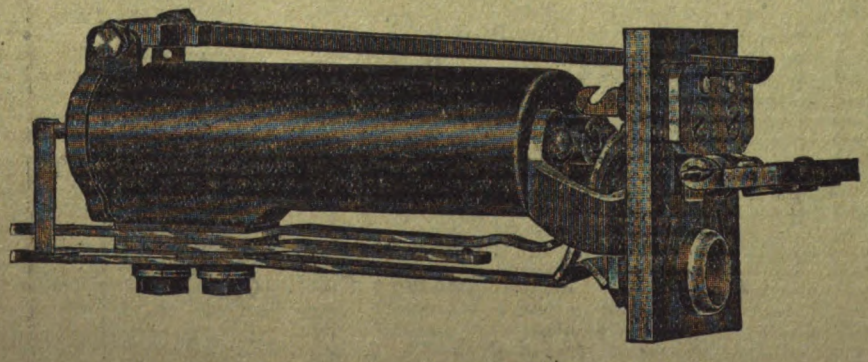
SELF-CONTAINED DROPS AND JACKS
RAPID RINGING DEVICE

All drops restored to normal position by withdrawal of plugs.

SEE ALSO OUR

BELL-EXPRESS SWITCHBOARDS

Which are built with self-restoring drops and jacks in banks of 5 and 10.



AT POPULAR PRICES

AMERICAN ELECTRIC TELEPHONE COMPANY

36-58 W. Jackson Blvd., CHICAGO

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THE AMERICAN TELEPHONE JOURNAL

Our New Department "In The Manufacturing Field"

In the last issue of the JOURNAL this department was added. We believe our readers are interested in new telephonic devices. It is our endeavor to keep matter appearing in this department to the same standard that characterizes our regular reading pages.

As we expected, the department has met with a cordial reception on the part of our readers, one of whom writes:

"The new departure in your issue of November 5th, 'In the Manufacturing Field,' cannot help being valuable, as it will enable readers to see what new things are being brought out. *No one can stay in the business unless he keeps up with its advances.* The man who keeps posted as to the different styles and kinds of apparatus can always tell where to get the supplies to fill any needs; if he will only write for prices, he will save money. This I know from experience.

"C. L. HOWK, Manager,
"Local Telephone Co., Norwalk, Ohio."

This letter is one of many that have already been received. We would like to have the views of all our readers on this new department.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—NOVEMBER 12, 1904—CHICAGO Number 20

PUBLISHED WEEKLY ONE DOLLAR A YEAR

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The AMERICAN TELEPHONE JOURNAL

NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

Subscription price $1.00 a year, payable in advance; foreign countries $3.00; single copies 10 cents.
Published Every Saturday by The American Telephone Journal Co. Entered at the New York Post Office as Second Class Mail Matter.

CONTENTS.

THE CONSTRUCTION WAGONS OF THE TWIN CITY TELEPHONE COMPANY.....By EDWARD A. TYLER
MAINTENANCE.....Article III. By ARTHUR BENSON
SPECIAL BRIDGE CROSSINGS.....By HAROLD A. McMANN
INTERIOR BLOCK DISTRIBUTION.....By FREDERICK D. BOND
A TYPICAL YEAR'S WORK OF AN INDEPENDENT COMPANY

The Operating Field.

REPORT OF DELAWARE AND MADISON COUNTIES' SYSTEM
A NEW MAINE COMPANY
EXTENSIONS OF P. & A. SYSTEM
TELEPHONE REGULATIONS IN SOUTH CAROLINA
EXTENSIONS OF UNITED STATES COMPANY
IN THE MANUFACTURING FIELD
THE TELEPHONE IN THE COURTS
QUERIES
PATENTS
THE EDITOR'S PAGE
THE WEEK'S MESSAGES
TRADE NOTES
WANT AND FOR SALE ADVERTISEMENTS, PAGE 29

It is not good business policy

to hang a valuable cable with cheap

Marlin Cable Hangers

We can furnish the best.
Prices and Samples upon application.

National Telephone Supply Co.,

CLEVELAND, O.

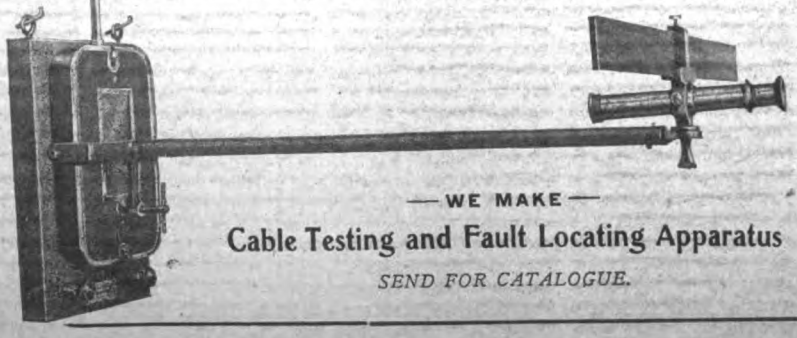
Anything New??? Yes!!!

Our **Columbia Special Transmitter** is the latest and most improved on the market. Ask us about it. Receivers? We have got them all beat in Quality and Price. Reconstructed Telephones and Switchboards—they are good as new.

Guarantee Telephone & Equipment Co.
(NOT INCORPORATED)
REMOVED TO
60-68 West Van Buren St., Chicago, Ill.

The Leeds and Northrup Co.
259 N. Broad St.
Philadelphia, Pa.

ELECTRICAL MEASURING INSTRUMENTS
D'ARSONVAL GALVANOMETER TYPE P.



—WE MAKE—
Cable Testing and Fault Locating Apparatus
SEND FOR CATALOGUE.

Stimulated by the large demand for a good Galvanometer at a reasonable price, we have gotten out this instrument. It is well made, of finished workmanship, pleasing appearance and excellent working qualities. Its low price is due to good design, careful manufacture and production in quantity, and in no detail to poor material or slighted workmanship. It has the following desirable features: Simplicity of construction, attractive appearance, the moving system always entirely visible, a proportional scale, a damped system and quick working, strong suspensions that allow no zero shift, ample coil clearance and a sensibility that is ample for all ordinary electrical measurements and many precision measurements.

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HAVING TROUBLE?

Ringing on your Farmer's or Party lines when the subscribers are listening on the line?

Put our X-P Condenser in your Bridging Telephones and your troubles cease.

PRICE IS LOW

YOU WILL WANT IT

ACTUAL SIZE.

Write us and we will give detailed information.

ELECTRIC APPLIANCE COMPANY

Telephone Manufacturers—Electrical Supplies

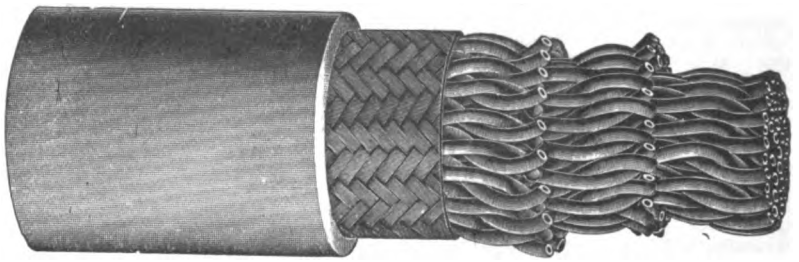
Chicago and San Francisco

WRITE FOR SAMPLE CARD OF WIRES.

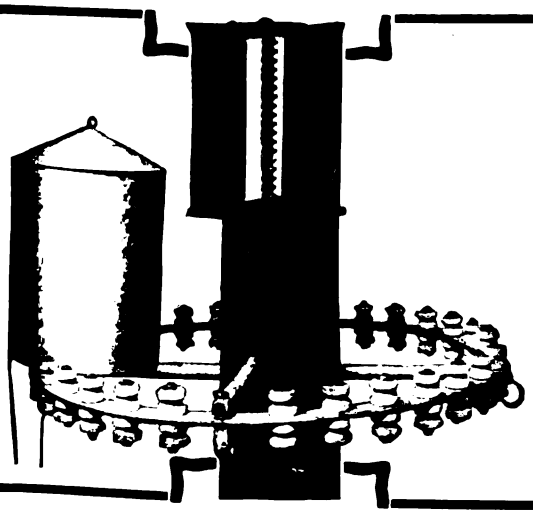
Manufacturers of

"Paranite"

RUBBER COVERED TELEPHONE WIRES AND CABLES :: :: ::



INDIANA RUBBER AND INSULATED WIRE CO. JONESBORO, IND.



THE HALL TYPE D. CABLE TERMINAL

WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***

Write for Catalogue.

Mountain State Electrical Company,

Sole Manufacturers,

WHEELING, W. VA.

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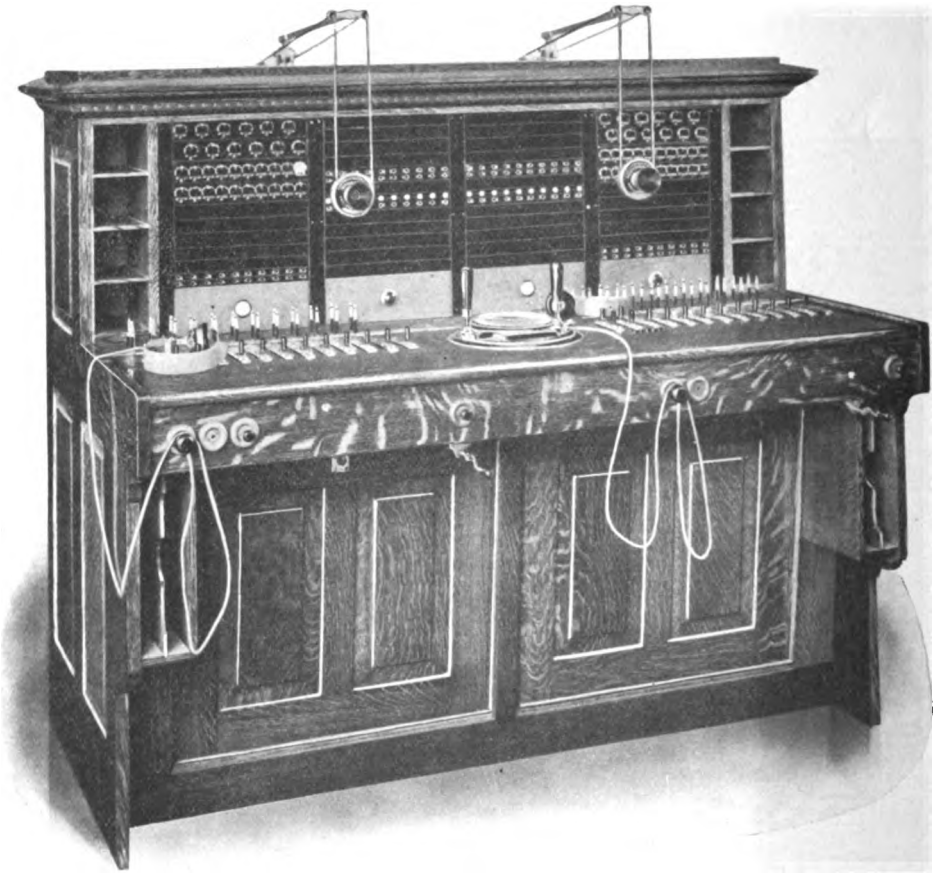
Stromberg-Carlson Toll Boards

are fully described in our new Toll Board Bulletin No. 12-B

This illustrates one of the many different types of boards shown in this bulletin.



If you are operating toll lines, it will pay you to get a copy. It's not only an interesting but a valuable book.

A postal request from telephone companies and managers will bring a copy.

JUST ASK FOR BULLETIN No. 12-B.

STROMBERG-CARLSON TELEPHONE MFG. CO.

General Offices -- Rochester, N. Y.

Western Sales Office -- Chicago, Ill.

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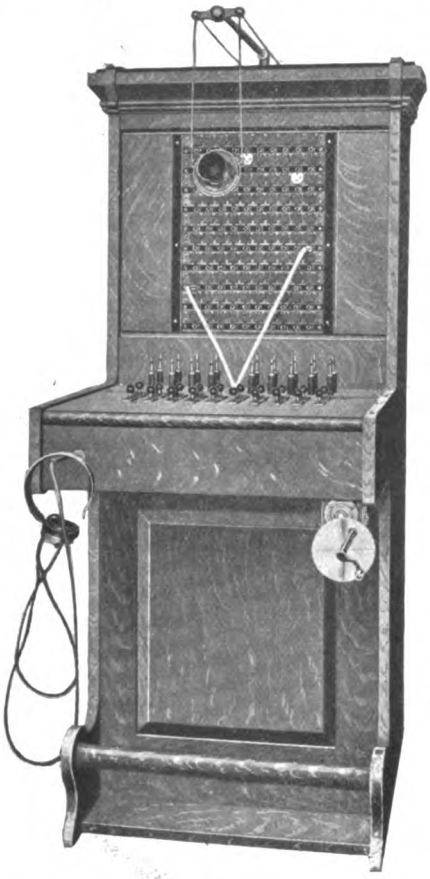
CENTURY
100% GOOD

Why We Would Like to Have You Investigate the Merits of Century Equipments:



Because we believe you are interested in thoroughly reliable apparatus built on practical lines.

The Century Type 5-A Magneto Switchboard was developed to meet practical requirements, and was proved thoroughly reliable in our own Exchanges before it was placed on the market.

We fully guarantee it.

We will be pleased to send you parts for your inspection.

Send for Bulletin No. 11.

CENTURY TELEPHONE CONSTRUCTION COMPANY.

OFFICE & SALESROOMS
528-540 ELLICOTT SQ.

FACTORY & WAREHOUSE
481-489 WASHINGTON ST.

BUFFALO, N.Y.

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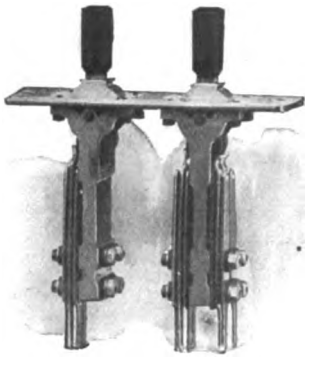
The Monarch Switchboard

has the characteristics of all MONARCH apparatus

SIMPLICITY DURABILITY EFFICIENCY



The drops and jacks, keys and other parts show practical advantages in the method of construction. Our well-known idea of mounting each and every part so that it can be easily removed or inspected is seen in the new board. Those requiring new switchboards will do well to get our prices and learn more regarding the apparatus before placing their business elsewhere. :: :: :: ::

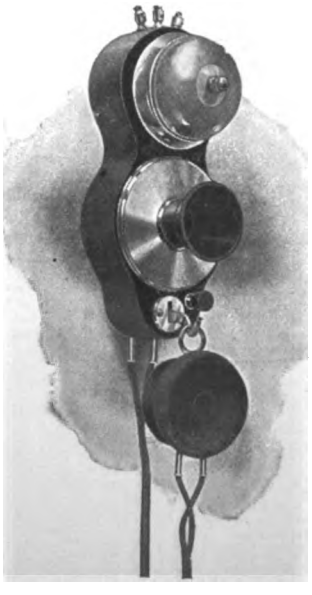
Our prices are right. Our board is right. Our deliveries are right.

MONARCH TELEPHONE MFG. CO.

10-16 So. Clinton Street, :: :: CHICAGO, ILLS.

No. 10

FOR PRIVATE LINES AND CENTRAL STATION SYSTEMS



Send for Bulletins

Get Our Prices

S. H. COUCH CO.

162 Pearl St., BOSTON, MASS.

CABLE TERMINALS

THE MOST PERFECT, CHEAP AND EFFICIENT TERMINAL ON THE MARKET. .. ..

SAMPLES SENT FOR INSPECTION.

Hipwell Mfg. Co.

ALLEGHENY, PA.

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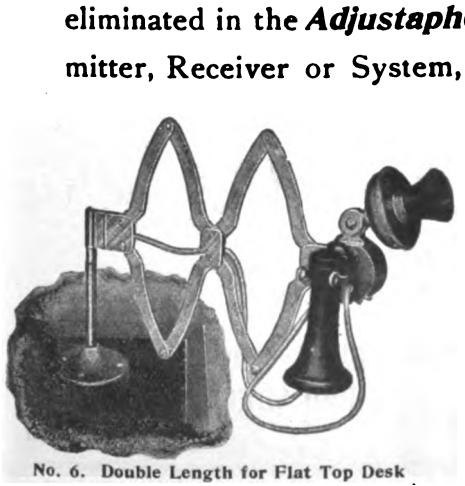
FARR TELEPHONE AND CONSTRUCTION SUPPLY CO., 118 and 120 W. Jackson Blvd., CHICAGO

The Adjustaphone

An invaluable adjunct to the busy man's desk. ***Saves time, temper*** and ***trouble***—one of those simple, right-hand devices that your subscribers appreciate at sight. All the faults of the old, breakable desk set have been eliminated in the ***Adjustaphone.*** Made for any Transmitter, Receiver or System, and for any style of desk.

No. 1. Closed and Swung Out of Way



No. 6. Double Length for Flat Top Desk

Mechanical perfection, durability and efficiency fully guaranteed. ***The best promoter of extended service and more business that a telephone company can use.*** Prices and full particulars on request.

Address Telephone Department

Chicago Writing Machine Co.

MANUFACTURERS

311 Wendell Street CHICAGO

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THE KELLOGG SWITCH-BOARD & SUPPLY CO.

Has Again Received

WORLD'S FAIR HIGHEST AWARD

FOR TELEPHONE SYSTEMS AND APPARATUS

IT was the GOLD MEDAL at the Buffalo Exposition. Now it is the GRAND PRIZE at the Louisiana Purchase Exposition, and the largest cities in the United States, equipped with Kellogg Telephone Systems, will heartily bear out with their recommendations the assigning of this award.

Write for our catalogues, bulletins and quotations.

The Kellogg Switchboard and Supply Co.

Green and Congress Streets, Chicago

SEYMOUR BUILDING
LOS ANGELES

ELECTRIC BUILDING
CLEVELAND

KEYSTONE TELEPHONE BUILDING
PHILADELPHIA

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Ericsson Four Party Line System

For simplicity, satisfactory service and good results, this system takes the lead. The line is perfectly balanced. Each subscriber is called without a chance of disturbing the others. One party can call central without disturbing the others on the line. Absolutely non-interfering. Extremely simple to install, to maintain and to operate. Few changes or additions necessary at the switchboards. Ask for particulars with prices, e c.

We supply party line telephones for common return or metallic circuits, either two or four on a line.

We manufacture a large line of telephones, switchboards and specialties.

Our wall or desk, sets, as illustrated, are growing in popular favor because they are so convenient. Price reasonable

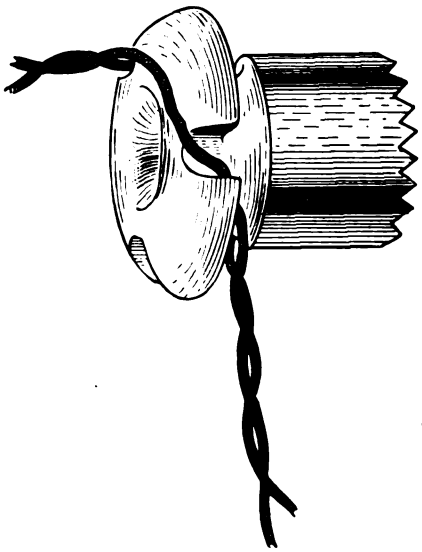
Ericsson Telephone Co.

Manufacturers of

SWITCHBOARDS, TELEPHONES AND TELEPHONE SUPPLIES

298 BROADWAY, NEW YORK

Polk Cut in Knob



No tie wires

Can't pull off.

Can run wires in any direction.

Send for Sample

Price per M $20.00

Wholesale Telephone Supplies

The W. G. Nagel Electric Co.

TOLEDO, OHIO

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Yesbera Mfg. Co..... —

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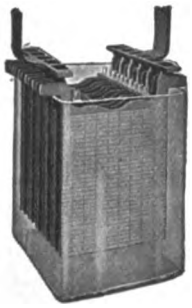

STORAGE BATTERIES

UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

NEW YORK OFFICE: 253 BROADWAY.

GENERAL OFFICES AND WORKS: BUFFALO, NEW YORK.

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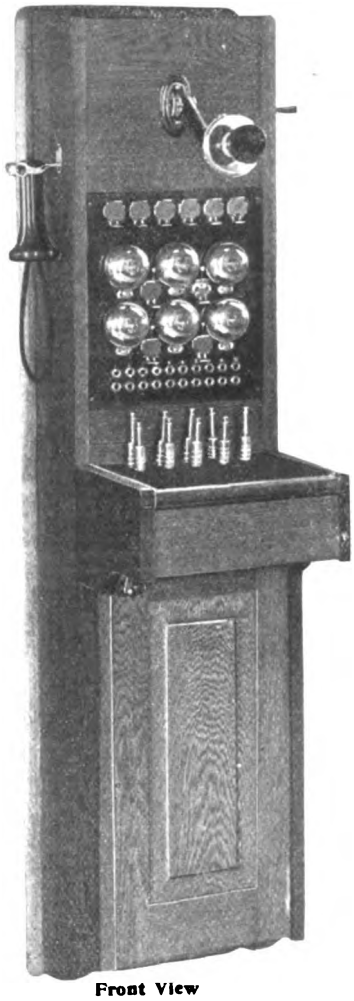


Front View

SWITCHBOARDS

For SMALL EXCHANGES

DROPS

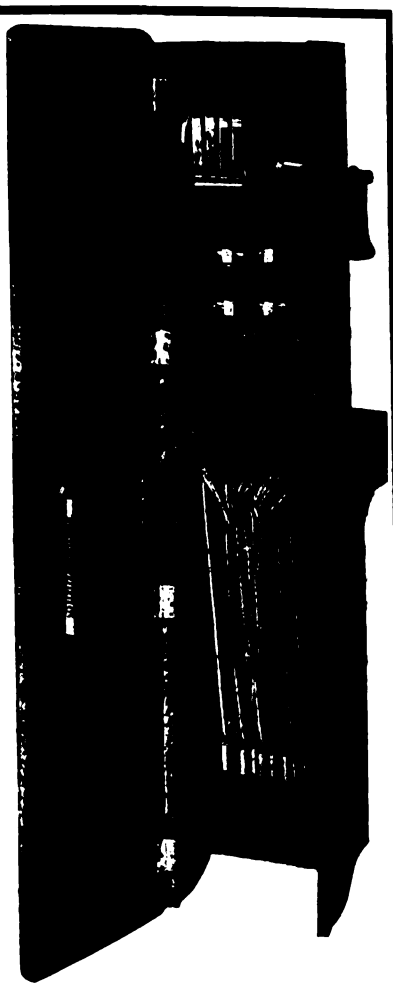
For INDIVIDUAL LINES

Drops and Bells

For PARTY LINES

STERLING ELECTRIC COMPANY

LAFAYETTE, INDIANA



Rear View

ADVERTISERS' DIRECTORY—Continued

BATTERIES.
Electric Appliance Co., Chicago, Ill.
Ericsson Telephone Co., New York.
National Battery Co., N. Y. City.
Nungesser Electric Battery Co., Cleveland, O.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

BLANKS, BOOKS AND FORMS.
Telephone Printing Co., Defiance, Ohio.

BONDS.
J. W. Middleton & Co., Chicago, Ill.

BOOKS.
Cantwell Printing Co., Madison, Wis.

BOOTHS.
Seaman, W. S. & Co., Milwaukee, Wis.
Yesbera Mfg. Co., Toledo, O.

CABLE CLIP.
Hubbard & Co., Pittsburgh, Pa.
National Tel. Supply Co., Cleveland, O.

CABLES.
American Electric Tel. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Chicago Insulated Wire Co., Chicago, Ill.
Kellogg Switchboard & Supply Co., Chicago, Ill.
Nagel, W. G., Electric Co., Toledo, O.
National Wire Corporation, New Haven, Conn.
Okonite Co., New York.
Runzel-Lenz Electric Mfg. Co., Chicago.
Roebling's Sons Co., John A., Trenton, N. J.
Standard Underground Cable Co., Pittsburg, Pa.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

CABLE HANGERS.
Bissell Co., The F., Toledo, O.
Cook, Frank B., Chicago, Ill.
Hubbard & Co., Pittsburgh, Pa.
Nagel, W. G., Eelectric Co., Toledo, O.
National Telephone Supply Co., Cleveland, O.
Standard Underground Cable Co., Pittsburg, Pa.

CABLE SLEEVES.
Bissell, The F. Co., Toledo, O.
Nagel, W. G., Electric Co., Toledo, O.

CARD INDEX SYSTEMS.
Telephone Printing Co., Defiance, Ohio.

CLEATS.
Morris Electric Co., Wilmington, Del.

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CONDUITS.
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Farr Tel. & Const. Supply Co., Chicago, Ill.
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Inland Steel Co., Chicago, Ill.
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CONTINUED ON PAGE 36.

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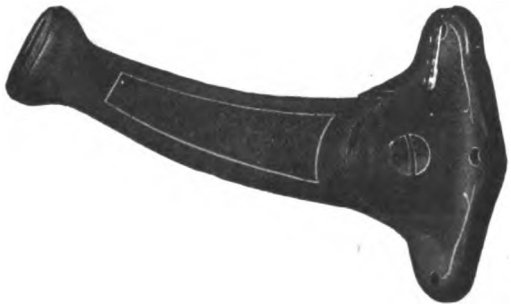

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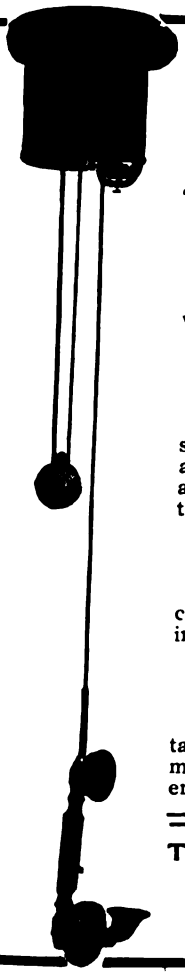

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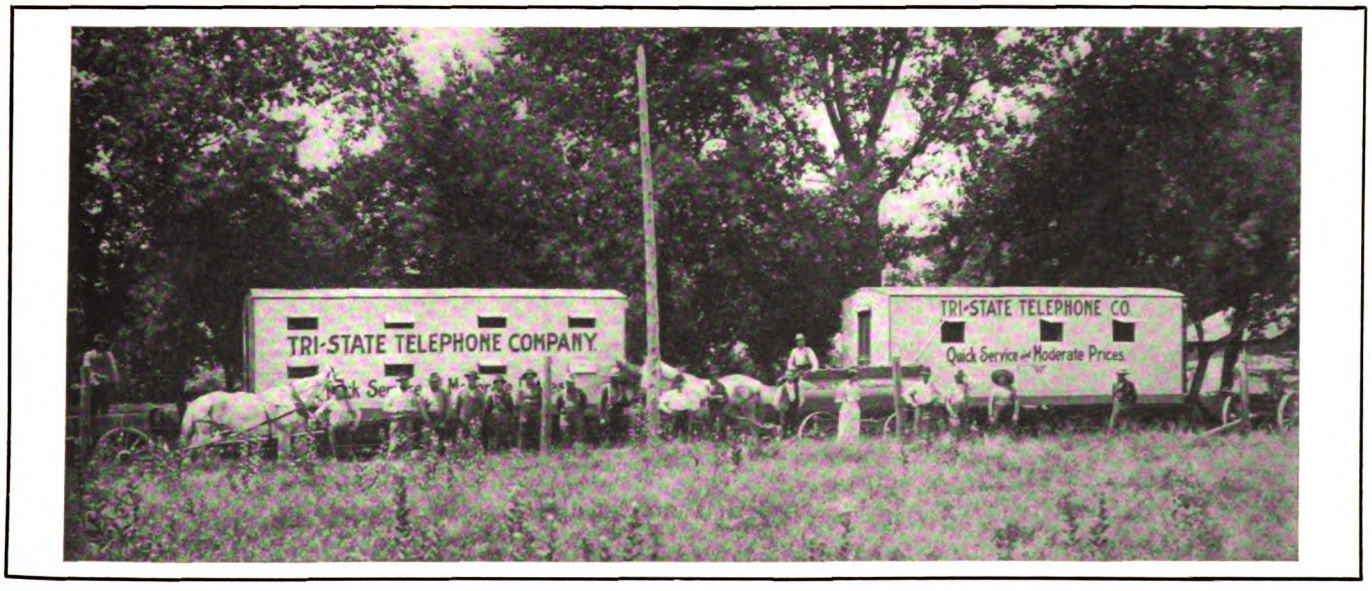
THE CONSTRUCTION WAGONS OF THE TWIN CITY TELEPHONE COMPANY

By Edward A. Tyler.

THE construction of long distance lines through sparsely settled districts offers some problems which are entirely new and not met with where the lines traverse a thickly settled country. The accommodations for the crew, such as sleeping quarters and meals, are often difficult to obtain, and even where they are satisfactory quite a great deal of time is often lost in going to and from work. To overcome this difficulty in the construction of its system through Minnesota and North Dakota, the Twin City Telephone Company has impressed into the service some wagons which offer a solution to this problem. The accompanying illustration will give a good general idea of their construction. They were designed by L. D. Richardson, General Superintendent of the Twin City Telephone Company, and built at the company's shops at a cost approximating $150 each.



Sleeping and Dining Wagons of the Twin City Telephone Company.

These wagons are arranged to accommodate sixteen men; one being used for the dining room and kitchen, the other for the sleeping quarters; each wagon is 8 feet wide, 26 feet long and 7 feet high, and is mounted on low trucks with wide tires, which offer a large bearing surface to the roadways, and reduce the amount of power necessary to draw them over soft tracks which would occur were narrower rimmed wheels used.

The dining wagon has a kitchen in the front end occupying a space 8 x 8 feet, the balance of the vehicle being used for the dining room. In the sleeping wagon the berths are arranged in tiers eight on each side. Besides these wagons, the Twin City Company has two others now being used in the construction of its line from Minnesota to Grand Forks, North Dakota. These are constructed on the same plan as the ones described, except that the sleeping wagon is higher, having three tiers of berths accommodating twenty-four men. On good roads only one team for a wagon is required, but where the road is soft, it is necessary to double up by using two teams. As the work progresses each day the horses used in the construction of the system are utilized to draw the wagons to new locations.

The advantage of this method of taking care of the crews are obvious, but the most important one is that the men are always on the ground where the work is being done, and thus no time is lost in traveling. In some instances, tents have been used where hotel accommodation was not available, but it will be readily seen that that method of accommodating the men is not to be compared with that obtained by the use of wagons. This company will complete its season's work about November 15, during which time it will have constructed 600 miles of No. 8 and No. 10 copper lines. This amount of work was largely due to the use of these wagons, which have given unqualified satisfaction and have been in service continuously.

It is interesting to note in connection with the construction and maintenance of telephone lines the application of modern methods in travel. Some of the largest telephone companies have introduced the automobile for repair work on long lines. Other companies have supplied their troublemen with motor cycles, and where these are not practical a good, swift horse and strong vehicle are always ready to be sent at a moment's notice to clear a case of trouble.

The old way has given place to the new, and where formerly a line might be in trouble for several days, if not a week, before being repaired, it is now but a matter of a few hours till service is restored.

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MAINTENANCE.

ARTICLE III.

By Arthur Benson.

GROUNDS.—The efficiency of the ground wire depends entirely upon the character of the connection between that wire and the ground, and therefore the utmost care must be exercised in performing this work. The office that the ground connection is to fill consists in carrying off high potential charges from the line, before they reach the subscriber's telephone, and thus to preserve that piece of apparatus and the subscriber's

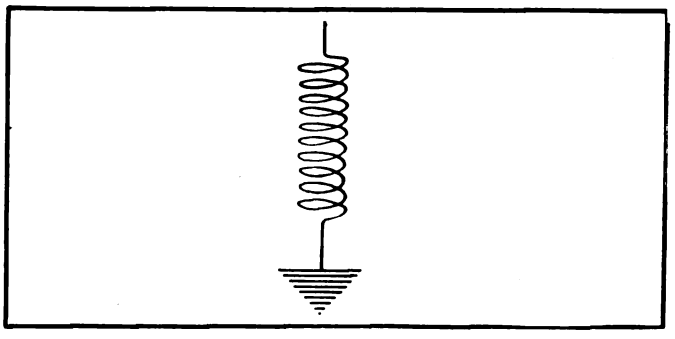

Fig. 4.

premises from destruction by fire. By far the most frequent cause of high potential charges on the line is lightning.

The features of the ground circuit are as follows: First: The ground wire shall be of sufficient size to carry off the largest possible current due to the charge. Second: Since the resistance of a wire to the flow of current increases with its length, the ground wire must be as short as possible. Third: Since the current flow due to a lightning charge is of the nature to set up a magnetic field in the surrounding air, which tends to retard its flow, and since this retarding effect increased with the number of turns or kinks in the wire, the latter should be run over the most direct path possible to the point where it is to make contact with the earth. All spiral twists, such as it used to be the fashion to make in the early days of the art, and a sample of which is shown in Fig. 4, must be avoided. Fourth: The contact between the wire and the earth must be permanent, and proof against mechanical injury, and of such a nature as to offer practically no resistance to the flow of current.

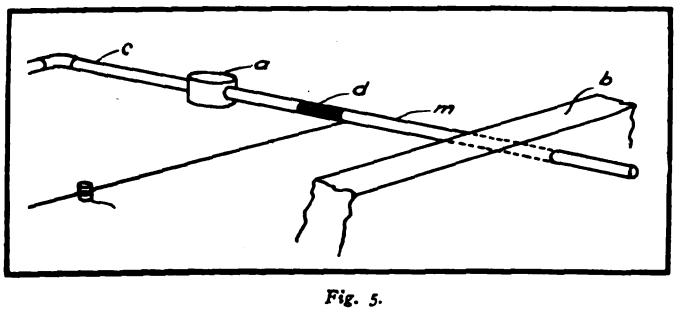

Fig. 5.

The first duty of the instrument setter, before he locates the protecting device, is to determine where the ground connection, or "ground," as it is called, is to be situated. He should then place the protection device in such a manner that the ground wire will be as short as possible. For example, if he has determined to locate the ground at a certain point in the cellar of the premises, the protector should be placed also in the cellar, and as near this point as possible. On the other hand, if the ground is to be located outside of the building, it will probably be best to locate the protection also on the outside. It must always be remembered that the ground wire must be the shortest possible.

Speaking generally, and leaving out of the consideration for the present, particular cases, there are two good ways to make a ground connection. First: By attaching the wire to a water pipe. Second: By attaching the wire to a copper plate sunk in moist earth. When the water pipe ground is used the following points must be observed. The wire must be attached at a point on the pipe, between the meter and the street main. The surface of the pipe where the attachment is to be made must be scraped bright and clean, preferably with a file. The wire must be thoroughly cleaned of insulation, scraped bright and wrapped firmly around the pipe twenty times and soldered. The joint must be thoroughly taped. In Fig. 5 is shown a ground connection to a water pipe, made in the proper manner. Here, the meter is shown at *a*, the pipe for house service at *c*, and that leading through the foundation wall *b* to the street main, at *m*. The ground wire fastened to a split knob insulator *e* attached to the ceiling beam, is shown wrapped twenty times around the pipe at *d*, which point is situated between the meter and the street main.

It is possible to solder the wire to the water pipe, without turning off the water, notwithstanding the fact that many stories are circulated to the contrary. To perform this work it is necessary to use a blow torch so that the surface of the pipe to which the connection is to be made shall be heated to the proper tem-

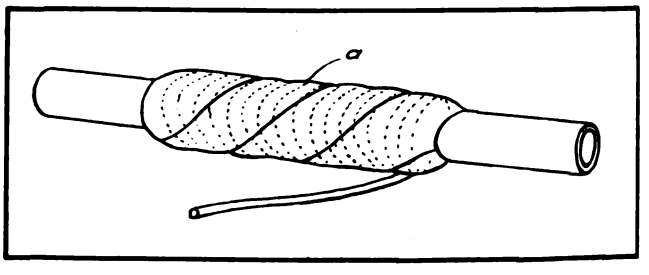

Fig. 6.

perature quickly so that the heat may not be conducted off to the portions on either side. The pipe must be heated sufficiently to cause the solder to run freely between the turns of wire. When the joint has cooled, the tape should be wrapped on.

It is sometimes impossible to make a soldered joint, owing to the belief that some building owners have that such joints injure pipes. In such cases it is necesary to wrap the joint tightly and carefully with tinfoil, so as to exclude the air and prevent corrosion. The tape is then layed on over the tinfoil. The tinfoil selected for this purpose should be free from dirt, paper or any foreign matter, and have a bright, clean surface. A joint of this description is shown in Fig. 6, where the tinfoil wrapping is shown at *a*, through which can be seen the convolutions of the wire. Grounds should never be made on lead pipes without first obtaining the sanction of the authorized superior officer.

Where the ground connection is made directly with the earth, two methods are used. Where the earth is moist the plan to follow is to sink to the depth of 6 feet, a copper plate 1 foot square, and about 1/16 inch in thickness, to which the ground wire has been soldered. Such a plate is shown at *A* in Fig. 7. The ground wire *c* is soldered by passing its end through a hole *b* in the groundplate *a*, bending the projecting portion so as to clamp the plate tightly, and applying the solder.

Where the ground is of a dry, sandy nature, a hole is dug to the depth of 6 feet and the copper plate, with the ground wire properly attached is lowered to the bottom. A bushel of charcoal or coke is then placed on top, care being taken to pack it firmly

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around the plate, and the earth then filled in. Such a ground is shown in Fig 7 at *B*, where the wire is seen at *a*, the plate at *b*, and the charcoal or coke at *c*.

Wherever the installation is adjacent to running water, such as a creek, inlet or river, a good ground can be obtained by lowering the ground plate to the bed of the water. In doing this, however, care must be taken to ascertain that the level of

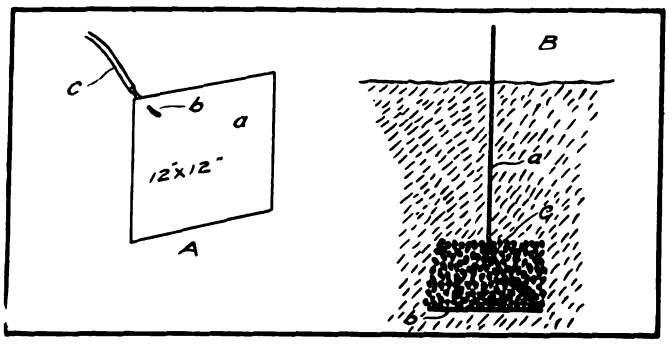

Fig. 7.

the water will never sink sufficiently to expose the plate, as should this happen the ground will become useless. Grounds should never be made in cisterns, since the rocks or cement with which they are lined form good insulators, and serve to break all electrical connection with the surrounding earth.

Ground connections should never be made on gas pipes, as they are often very poorly connected to the surrounding earth; and as a piece of advice which may appear unnecessary to the majority of instrument setters, but which experience has shown to be very necessary to some, let it be added that they should never be made to safes, or water coolers.

In running the ground wire care must be taken to support it on porcelain knobs, to keep it separated by at least 3 inches from pipes, and to bush all holes through which it passes with circular loom, hard rubber or porcelain.

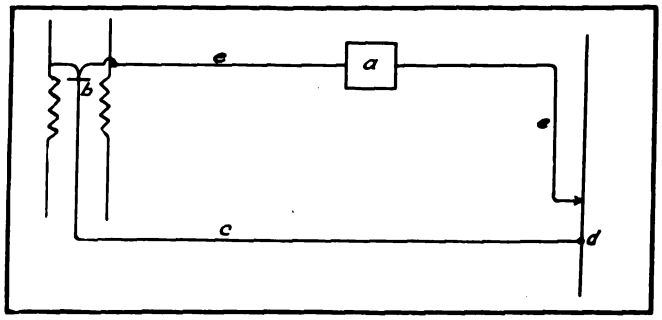

Fig. 8.

Afer the ground connection is completed it should always be tested by connecting one pole of the test set to the ground plate and the other to the pipe and ringing. The circuit through which the ring of the buzzer is obtained is shown in Fig. 8, where the ground plate of the arrester is shown at *b*, the ground wire at *c*, which is soldered to the pipe at *d*. The test box is shown at *a*, and the testing wires at *e*. If the ground connection at *d* is defective the buzzer will not ring.

SPECIAL BRIDGE CROSSINGS

By Harold A. McMann.

SPECIAL cases in pole line and open wire construction constantly confront the modern telephone engineer. Bridge crossings, either aquatic or on terra firma, offer quite a field for ingenuity in this line of work, and many novel schemes appear.

Take, for instance, a railroad bridge that crosses a road upon which a pole line is to be built.

and the crossing made directly over the tracks; both of these methods would probably necessitate extensive guying.

Probably one of the best ways of eliminating the use of poles altogether in similar cases is to use special cross-arm supporters or suspenders.

The general idea is clearly shown in Fig. 1.

The principal parts of the contrivance are the wrought-iron

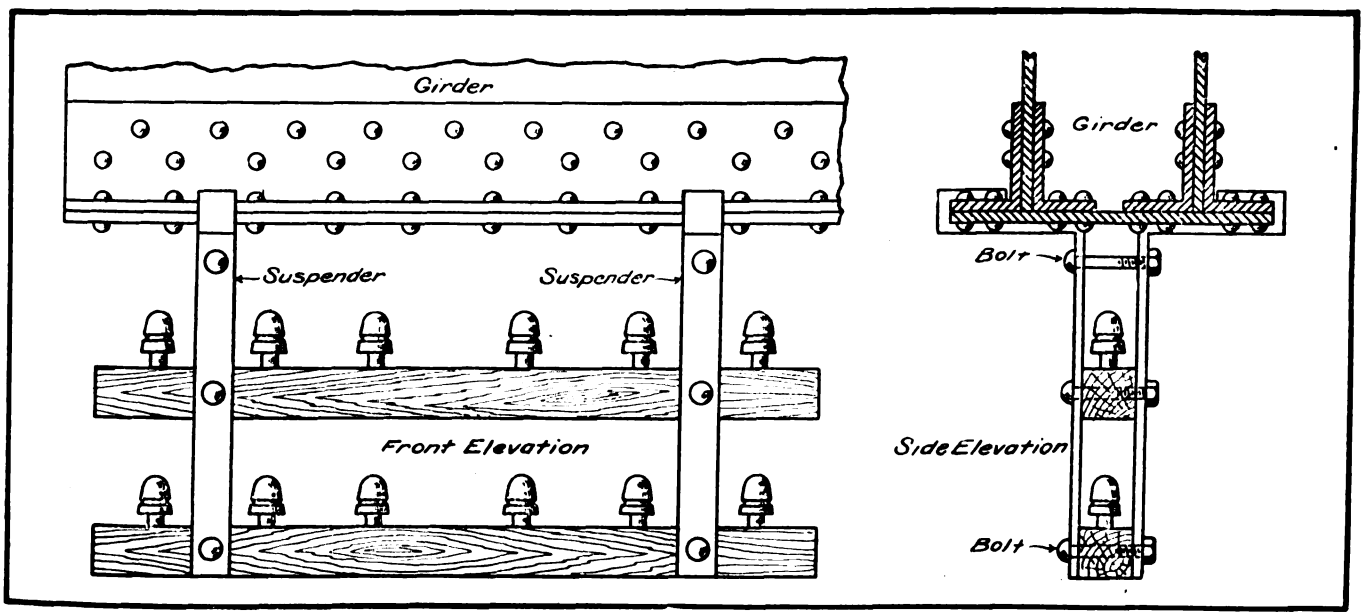

Fig. 1.

If the clearance between the bottom of the girders and the surface of the road is, say, 30 or 40 feet, it is a simple matter to run the wires under the bridge, using possibly 20 or 25-foot poles.

Then, again, if the bridge is quite low, higher poles can be used

straps. These should be from ⅜ inch to ⅝ inch in thickness, according to the number of arms they have to carry, and about 2½ inches to 3 inches in width.

The upper portion of the strap is bent to conform to the general shape of the girder.

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The straps should have ½-inch bolt holes bored in them, to attach them to the girder and to hold the arms. The approximate locations for these holes are shown in the drawing.

Standard cross arms are used, holes to accommodate a half-inch bolt being bored in them between the pins.

The straps are first slipped on the girder and bolted in place; then the cross arms are put in position between the straps and securely bolted.

The length of the straps is determined by the number of cross arms to be used, the distance between the arms being about the

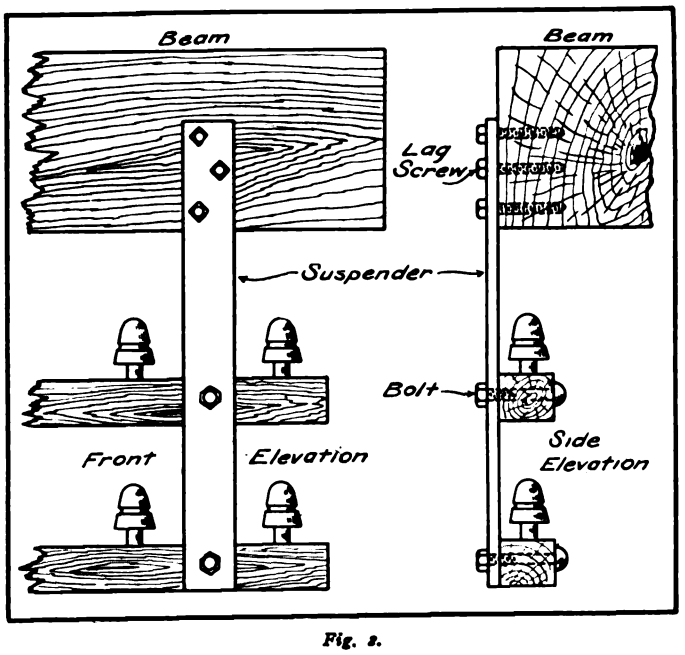

Fig. 2.

same as on a pole. Two sets of straps will generally be found sufficient to hold four or five, six to ten pin arms.

A method of attaching straps to a wooden bridge is shown in Fig. 2; only one pair of straps in this case is needed.

The straps do not have to be bent, being simply screwed to the wooden beam with two or three ½-inch lag screws, and the cross arms being attached as specified above.

For an ordinary bridge of from one to four tracks, one of these fixtures on each side will be found sufficient.

Two coats, at least, of metallic paint should be applied to the straps to prevent rust.

A method of crossing a river by attaching poles to a bridge is shown in Fig. 3.

In this case ½-inch wrought-iron straps about 4 inches in width are used, being bent to conform to the curvature of the pole being used, leaving a tangent of about 15 inches for attaching to the posts of the bridge. Four or five holes should be bored for ¾-inch lag screws.

Two straps should be used for each pole, unless the line is very heavy when more would be necessary.

After the poles are clamped in position with the straps, a few

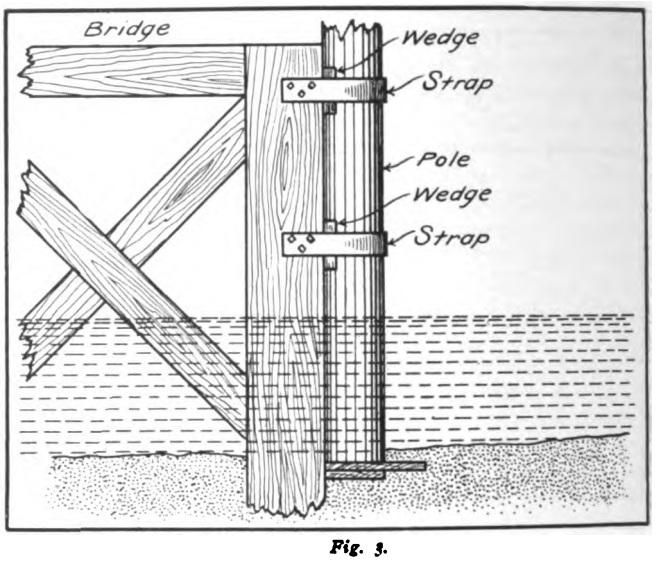

Fig. 3.

wedges of creosoted wood should be driven between the pole and the strap to eliminate the possibility of the pole slipping.

If the bridge is low and the water quite shallow, say 6 feet, the poles may be planted directly in the bed of the river. To

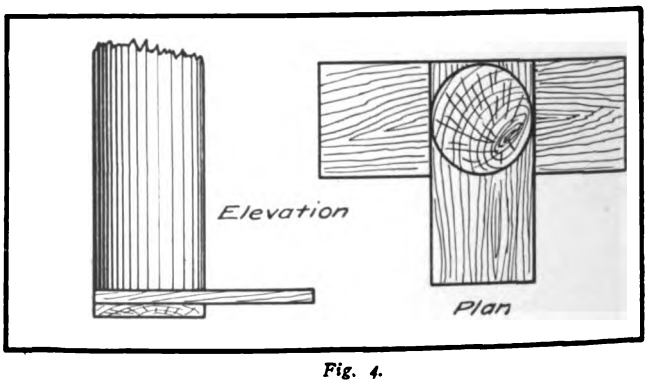

Fig. 4.

prevent undue sinking of the pole, a sort of float or platform may be improvised out of some 3-inch creosoted planks and fastened to the butt with heavy nails or lag screws; this arrangement is shown in Fig. 4.

INTERIOR BLOCK DISTRIBUTION

By Frederic D. Bond.

THE chief problem in telephone construction is to so build as to give the best service at the lowest equipment and operating costs. In an attempt to solve this problem a host of minor changes in building and working telephone plants are every year initiated, and within the last few years many companies have tried a new plan for the more economical distribution of the lines in crowded cities. This is known as Interior Block Distribution.

By the old method system each pair ran directly from a terminal situated on a street, or preferably on the corner of two intersecting highways to the subscriber's premises. This arrangement was the same whether the pairs came from an underground conduit or an aerial line.

In many cases this plan of distribution may prove desirable; but it became evident some years ago that there were a number of instances in which it could be improved on. In the first place, access to buildings is often difficult to obtain where the lines run directly to a street terminal; then the number of pairs open to trouble is manifestly larger in a crowded block.

The old system of distibution was open to the charge of incurring useless expense in many instances. A larger amount had to be expended in wire, rights of way and construction in this plan than required by the new block system of distribution.

Figure 1 shows the general plan of a system of interior block distribution. A cable leaves the terminal box at the corner of two streets which may be called Spring and Montgomery. En-

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tering a building it runs through the basement and ends in a cross-connecting box on the rear wall of where it divides into ,two smaller cables which branch out in different directions over the interior of the block, to feed the substations.

Fig. 2 gives the cable plan. Fifty pairs come from the street terminal in a cable. At the cross-distributing box, half of the pairs go into line "A" and the other half into line "B," an extra pair being allowed in each of these smaller cables to locate trouble.

These two cables now run around the rear of the houses, some times on the falls and some times on the fences. In choosing location for the cables the engineer is guided by practical construction. He may place the cable on the side of the

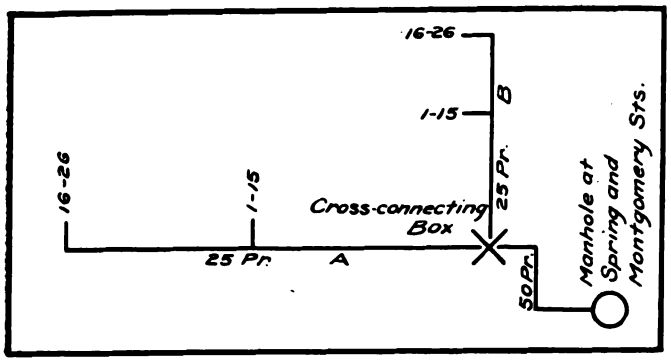

Fig. 1.

fence, or on its top, or attach it to the outer wall of a building, or do any, or all things that convenience suggests. Usually, it is easy to procure rights; frequently, indeed, owners will give it for the asking, and when refused, there is the advantage that new places are always on hand.

In considering the advantages of interior block distribution, it should be kept in mind that the benefits are always of a relative nature, and that no scheme of running wires from terminals to substations is conceivable that does not involve difficulties that the engineer would prefer to avoid. Nevertheless many of the difficulties of distribution are got rid of by the block system.

Probably the greatest objection to the old plan has been the difficulty with underground wires, of getting direct access from the terminal to each substation. The interior plan is much easier. First was the difficulty of entering the house; occasionally this could be done by aerial pairs issuing from the top of a terminal; but usually in a city it was necessary to pierce the walls of as many buildings as there were substations. Oftentimes, the character of the ground itself rendered the proceeding a difficult one, and owners would frequently object. But the greatest attendant expense was the necessity of tearing open the street every time a pair was to be run from a conduit.

By the block system the entrance into all the houses, except

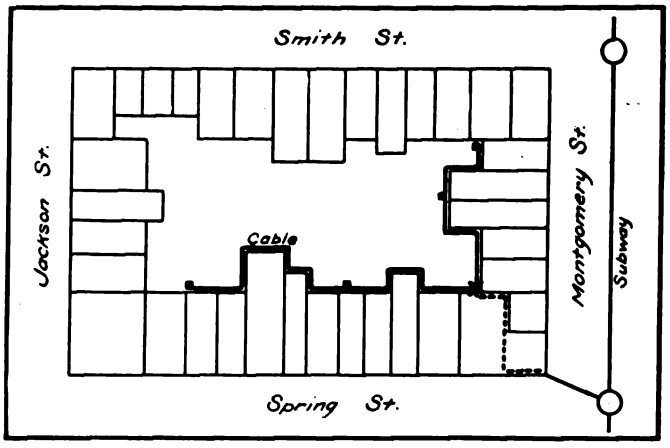

Fig. 2.

the one traversed by the cable immediately on its leaving the terminal is effected by an aerial line running from one of the distributing points on back fence or wall. This removes any necessity for any street work. The street need be torn up once only. A large enough cable is run from the start to accommodate all the subscribers the block is likely ever to possess, and so the greatest difficulty in the old plan is avoided at the outset. Then, when a subscriber wants service discontinued, it is hardly needful to point out how much more easily this can be properly effected under the conditions of this system than under the other.

A PECULIAR ACCIDENT.

A PECULIAR incident which recently took place in Indianapolis, Ind., is attracting the attention of telephone men and the public generally. The circumstances in the case were these: James Adams, of 1624 Cornell avenue, was standing at an office desk on which were two telephones, one belonging to the Indianapolis Telephone Company and the other to the Central Union. Having occasion to call a party he took up the telephone belonging to the Central Union Company, but failing to get the number tried the telephone of the Indianapolis Company. Both were metal desk stands, and it happened that their bases were touching. Adams took the receiver from the hook of the Indianapolis telephone and, while waiting for the number, rested his chin on the top of the Central Union instrument; a shock resulted that rendered Adams unconscious, causing him to fall to the floor. When revived, on attempting to move it was found that he was paralyzed from his waist to his feet, and at the same time he suffered a great deal, and it was thought that he would die.

The wire chiefs of both the companies advanced the theory that Adams was stricken with paralysis while standing at the telephone, and that the shock received, if there was any, had nothing to do with his condition. It was found that the wires were safe from contact with other wires and that the current was not strong enough under any condition to produce results that would cause paralysis. It was claimed that if the operators at either of the exchanges had rung the telephones while Adams was in the position described that an electrical pressure of about 75 volts would be given; but this is not probable, and even 75 volts is not enough to harm most people in the slightest degree. On the other hand, the attending physicians state that Adams was in perfect health, and they believe that paralysis resulted through a shock received from the telephones. Mr. Adams is gradually recovering use of his legs, and his ultimate recovery is looked for, but in the meantime this unusual accident is causing a great deal of comment among physicians and wire chiefs throughout the country. The officials of the telephone companies are at a loss to know what caused this accident, as the wires have been examined and found protected in a thorough manner.

AN INDEPENDENT SYSTEM FOR DALLAS.

A MASS meeting was recently held in Dallas, Tex., for the purpose of considering a proposition offered for an Independent telephone company. The meeting was addressed by several influential citizens, among them being Gen. M. M. Crane, Capt. A. J. Brown, Dr. C. M. Rosser, J. W. Blake, Judge Aldredge, Frank Irvine and C. A. Keating. All of the above, with one exception, were in favor of a competitive system, and brought a number of instances to bear upon the subject.

The company which is endeavoring to secure a franchise promises to expend three-quarters of a million dollars in improvements incidental to the construction of the system, besides paying $1,500 for the first period, $2,500 for the second, and $3,000 for the last. J. W. Blake made a telling argument in favor of an Independent system, citing instances where two telephones had been of immeasurable benefit in securing better service, lower rates and increased facilities. The matter will be submitted to ward meetings, and it is expected an Independent franchise will be granted.

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A TYPICAL YEAR'S WORK OF AN INDEPENDENT COMPANY

The following annual report of the Home Telephone Company, of Jasper County, Missouri, showing results obtained under progressive administration, has just been submitted by President Theodore Gary to his stockholders. It is republished practically in full as a fair example of the kind of work that is being done to-day in the Independent field.

THE work of rebuilding the Joplin plant has been finished. The Webb City plant has been practically rebuilt from one end to the other. Forty-five hundred feet of cable put in, new poles set, and the entire plant made metallic. Central office moved into a substantial building. Plant is well equipped now, notwithstanding the fact that the Bell Company recently put in a central energy plant at this place, (you remember we had no competition until during the last year), we are making a very substantial increase in our subscribers. We have 312 subscribers in Webb City against 280 a year ago, and we have sufficient switchboard and cable capacity for upwards of 400 telephones.

Carterville has a completely rebuilt central office. We have considerable excess switchboard and cable capacity at this place. Plant is in good shape. We have 165 subscribers here against 140 a year ago. Here, too, the Bell Company have put in a new plant, they not having one here before this year. In face of the fact that the Bell has a central energy plant here our business is increasing and at no time in our history have we had such a demand for new telephones as at this time.

The Carthage plant has been practically rebuilt throughout; have put in that exchange about 20,000 feet of new cable; have some 4,000 feet yet to go up. By special arrangement we have built a one-story and basement building; first floor is up about five feet from the sidewalk, and occupied exclusively by the company; stands on a lot 50x200 feet, on which we have an option to purchase at $5,500. Plant is in excellent shape.

In addition we have lately made arrangements to connect 100 farmers in the northeast part of Jasper County with Carthage Central for a term of twenty-five years on very advantageous basis, both to our local subscribers and the company. Since our last annual meeting, we have the long-distance connection with Kansas City and St. Louis by the Kinloch Company over a line that was built from St. Louis direct to Joplin, at a cost of over $800 per mile, that being the southwest terminus of their line. It is said to be the best line ever built in the United States. This contract runs for twenty-five years. Have lately entered into contract for toll connection with southeast part of Kansas and the northern part of Indian Territory. In addition, have a contract with Springfield for a toll connection to run twenty-five years. This will give us very good outside connections.

In addition to rebuilding the several plants, we have been able to reduce operating expense considerable. At Carthage a new board has been installed and where it used to take seven operators at one time to handle the business we now have but five, but do the work as well or better than we did before. At this place the Bell is making a vigorous effort to increase their list, and even offering free service until they have 200 subscribers. They have just completed the rebuilding of their plant at this place. We have over 700 of our own, besides 100 others, making over 800 connections in Carthage for our subscribers. Besides, we have other facilities to be put in force at Carthage that will enable us to earn $1,000 more net a year without any further investment. At Joplin, changes have been made in the rates that amounts to 50 cents a month for residence and 50 cents a month for business, increase for single line, which makes our rates *50 cents more both for residence and business service than the Bell are charging now. Notwithstanding that fact, we have a large waiting list and more orders than at any time in the history of the company.*

Up to this time we have never paid much attention to increasing our list of subscribers, as it was found early that an improvement in rates and earning capacity of plants was absolutely necessary before any new business can be handled profitably, therefore the management has devoted more attention to increasing the earning capacity than the number of telephones.

The improvements have been made to all the plants with a view of increasing the business without a great increase in the outlay. It is confidently believed that 1,000 subscribers can be added to the plants with an expense of not exceeding $25,000, owing to the fact that the switchboard and cable capacity is sufficient in most places to take care of an increase, if fairly well distributed over the system. This will greatly increase the income, without a comparative increase in the outlay. The management expects to make a very satisfactory showing during the next fiscal year, owing to the fact that the demand for telephones was never better or the service of the company excelled, and the company just ready to profitably increase its business.

The telephone situation has greatly improved. The Kansas City Company has in excess of 9,000 subscribers, and has extended its toll lines in various directions, connecting up the adjoining towns with more than 50,000 Independent telephones tributary to Kansas City, all of which have been bound together by long-term contracts running from twenty-five to forty-nine years. While the companies are owned by individuals, they are operated as one company. The telephone situation in the vicinity we are operating is the most favorable, conditions exceptionably favorable for active business, and the management can assure the stockholders that there is no lack of business in the districts and territory the Home Company's plant cover. The only question for the management to solve was how to handle this business at a profit, and that has been the main question heretofore under consideration. We feel that we have the plant on a basis that we can increase the business by one-half to two-thirds at a profit.

When the plants were consolidated two years ago the nominal number of telephones used was 2,135, at an annual rental of $42,218, or an average income per telephone of $19.72. In spite of the stiffening of rates and more or less interference with the service by rebuilding, etc., our subscribers have been increased to 2,285, or an increase of 150. While the increase in number has not been large, it is entirely satisfactory to the management. The earning capacity of the plant October 1st was $51,184, or $22.40 for each telephone, or a net gain per telephone of $2.68. A total increase in earning power from $42,218 to $51,184 being $9,966 increase in gross receipts. It will be impossible to give a comparative statement of net earnings on account of the fact that the old company did not properly classify their several disbursements, but a comparison of the gross and net earnings for the past two years are as follows:

Income 12 months ending September 30,	1903.	1904.
Expense, maintainance, etc.	$42,147.00	$46,949.69
About 63 per cent. of income 1903 } About 55 per cent. of income 1904 }	26,038.00	25,781.98
Net earnings	$16,111.00	$21,167.80
Net gain in net earnings over 1903		5,056.80

Financial Statement of the Home Telephone Company of Jasper County, Mo.

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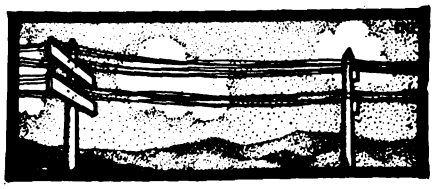
QUERIES

Questions on any subject relating to telephony will be answered on this page.



SERIES INSTRUMENTS ON PARTY LINES.—(449.)

I enclose herewith a diagram for using series telephones specially wound for use on party lines. Can you tell me whether this system will work properly or not? C. B. H.

While it might be possible to operate the circuit you describe, yet we doubt if any good results could be obtained if the line was any length at all. The circuit, as shown in Fig. 449, would probably be noisy. Furthermore, we note that you use all your bells on one side of the line to ground, and therefore the system is, under these circumstances, non-selective. Again, in ringing the distant instrument, on account of the low resistance of the bells, the ones nearest the station ringing would receive all the current, and we doubt whether the generators would be able to supply enough current to ring the bells satisfactorily. We would suggest using a selective party-line system which contains high-wound bells and an ohmic resistance of from 2,000 to 5,000 ohms to ground.

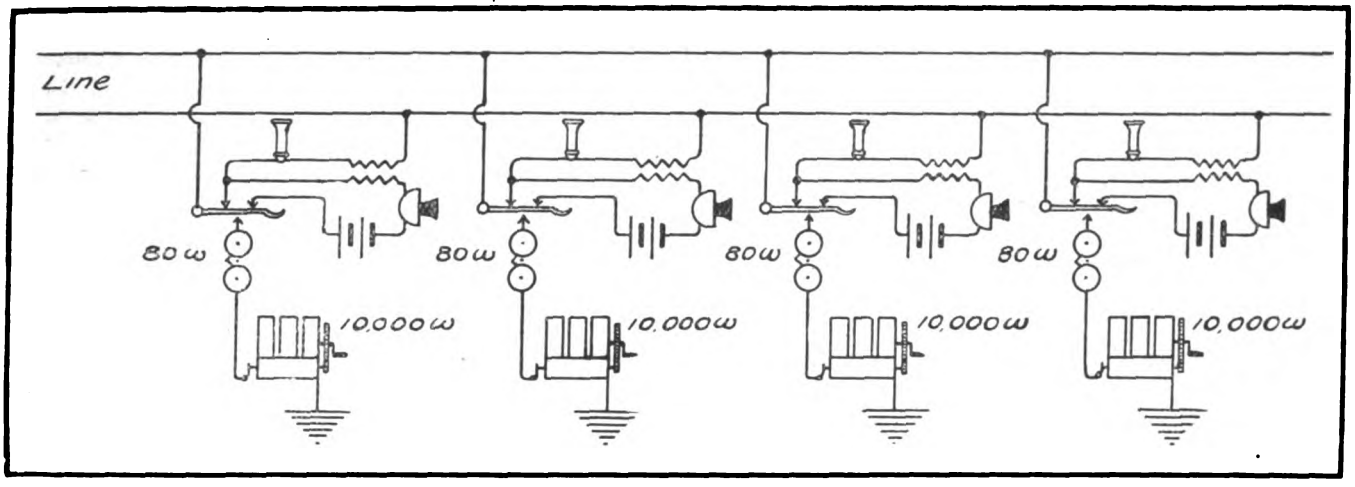


Fig. 449.

We see no advantage in installing the circuit in the way you suggest, and think you would do better to follow the standard practice.

POLE SETTING.—(450.)

How can I set a pole in soft ground without it sinking in? We have a long line contemplated which we can save a lot of wire upon if you can offer a solution. G. L. L.

One of the best methods is illustrated in Fig. 888. Set the pole

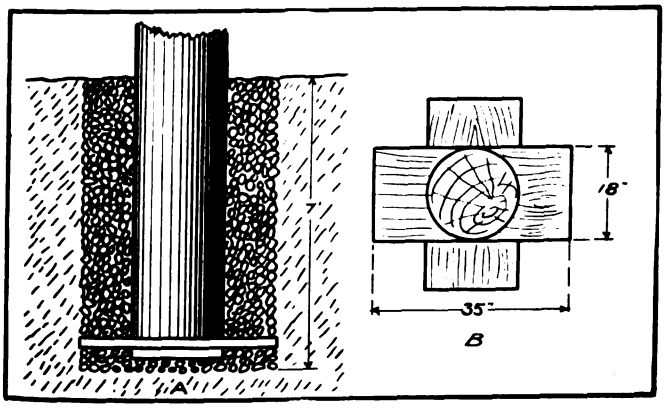


Fig. 450.

in a concrete envelope composed of rubble; one part cement, two parts sand, and four parts stone. To the bottom of the pole a platform should be attached, as shown in the figure. This eliminates all possibilities of the pole sinking and at the same time the use of the concrete secures a foundation which has a great amount of stability.

GROUNDED CIRCUITS.—(451.)

We have three grounded circuits on the same poles, two circuits, No. 14 wire, one circuit No. 12 wire running three miles. At this point, the No. 12 wire branches off, covering an area of twelve miles with fifteen instruments. The two No. 14 wire lines parallel for two miles, and one of them continues three miles further on, and is used as a toll line, the other has six telephones connected to it. The No. 14 wire is old and rusty, the No. 12 wire is new. We have trouble in ringing. What would be the cause? We hear cross-talk or induction from the No. 14 lines on the No. 12 wire line very plainly. Is this due to the current taking the path of least resistance? J. E.

In the first place, with grounded circuits it is impossible to get rid of cross-talk on account of induction; the only remedy is to make the circuits metallic and transpose. The number 14 wires being old and rusty probably offer a very large amount of resistance at the splices. This would account for the difficulty in ringing the distant parties. In the case of the number 12 wire, if the resistance of the ringers is low it will be impossible to ring them successfully because the generator you employ does not furnish enough current for the purpose.

The resistance of instruments on this line should not be less than 1,600 ohms, and it would be much preferable to have them of 2,500 ohms. We believe that it is absolutely essential that the toll line should be made metallic, because it is liable to transmit to a much greater extent the inductive disturbances from one system to another if it is grounded. The old No. 14 lines should be replaced or else all the joints resoldered.

LINE CONSTRUCTION.—(452.)

We are going to build a telephone line. About how far apart should the poles be spaced? Should we use brackets or cross-arms?

The standard practice in pole line construction is to space the poles about 40 to the mile, although in turning corners the number may have to be increased. If iron wire is to be used, 35 poles to the mile might be sufficient. If the pole line will never carry more than two wires brackets might be used, but it is much preferable to use cross arms, as should the contingency arise necessitating a new line there would not be the cost of replacing the brackets with arms.

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RESPECTFULLY SUBMITTED TO OUR BELL FRIENDS.

IN another part of this issue there appears the annual report of President Theodore Gary to the stockholders of the Home Telephone Company, of Jasper county, Missouri. We commend a careful reading of this report to our friends in the Bell ranks, as well as to our friends, the Independents.

We have had much to say during the past two years about the Bell press bureau methods. We have pointed out rather sharply the dishonesty involved in circulating, through the medium of newspapers that are willing to sell their columns for a price, false statements concerning the progress and financial standing of Independent telephone companies. It is too much to expect that the exposures we have made from time to time in this regard are going to result in putting an end to this method of press campaigning on the part of the Bell interests. Our main object in meeting these false statements in print, has been to furnish ammunition to those Independent companies that are made the victims of this sort of work. It has been our hope that the Independent companies, having behind them the support and good will of their neighbors, would be in a position to secure the aid of the honest newspapers in their vicinity, providing the right sort of material was furnished, and that in this way the evil effects of the Bell literary bureau could, in a measure, be offset. Nothing is easier than to meet the Bell misstatements, as the Independents can draw on their own experience for facts and figures that will confound their enemies. It is because we believe that in the report submitted by Mr. Gary, there may be found such material that we reprint it. It is not made public because it is exceptional or extraordinary, but because we believe it reflects the general condition to be found to-day in the Independent industry. And it is only necessary that facts such as these be presented to nullify absolutely the influences that the paid articles put out by the Bell are supposed to exert.

Mr. Gary, as much as any other man in the Independent ranks, has felt the influence of the underhand Bell methods. His territory, both in Jasper county and in Macon county, has been literally flooded with anonymous matter, put out for the purpose of frightening would-be investors in Independent securities. Capital is proverbially timid, and especially susceptible to attacks of this kind. It is not surprising, therefore, to find Independent companies hampered here and there for capital to meet extension demands, notwithstanding that they can show the enormous profits that would come to them from the building of such extensions. What, for instance, could be more inviting to capital than the condition described by Mr. Gary in the concluding section of his report, where he says that 1,000 subscribers can be added to his company's system to-day at an expense not exceeding $25,000, or at the rate of $25 each, owing to the fact that the improvements already effected were especially planned to take care of increasing business without much increase in the outlay. As the average receipts in this system are now at the rate of $22.40 for each telephone installed, it will be seen that in the addition of the 1,000 subscribers alluded to, the company would almost clear in the first year's rental the total investment required for this extension.

Another significant section of the report to which we would like to call special attention is the fact that though the rates in Joplin have been increased $6 a year and that they are now $6 a year higher than the Bell rates, Mr. Gary's company has a large waiting list and "more orders than at any time in the history of the company.

AN ILLUSTRATION OF INDEPENDENT FINANCE.

As we have said before, the conditions shown by this report are not exceptional. We doubt even that it represents on the whole the average condition in the Independent industry, for the plants which Mr. Gary and his stockholders consolidated, were in rather a bad way, and the process of reorganization under the present management has been in force a comparatively short time. Surely an industry that is built on so solid a foundation can get all the capital required to meet its growth. It is only necessary to spread the facts before the people, to educate the bankers and investors, to insure more money than is needed.

NOT INSTALLING LIGHTNING ARRESTER.

FRANK B. WOODBURY, of Syracuse, N. Y., has commenced suit against the Empire State Telephone and Telegraph Company for damages he claims to have received by the destruction by fire of his new chair factory.

On the evening of June 14, a heavy electric storm passed over Orwell. Between eleven and twelve o'clock that night there was a blinding flash of lightning and a terrific roar of thunder, it is claimed, and almost immediately flames burst out in the factory. All the building, it is claimed, was dark except where the telephone wires entered and there was the starting point of the fire. It is also claimed that lightning struck the telephone wire some distance from the factory, shattered the poles and entered the building.

The telephone company is charged with the blame. It is asserted that the company was negligent and careless in failing to install the usual lightning arrester with the usual ground wire and in failing to put the ordinary insulation about the wires which entered the building.

There is a lesson in this suit that ought to appeal to every operating company. This is the wisdom of equipping a plant in all its divisions with proper protective apparatus. The cost of protection is so small relatively, when the possible damage which can occur due to lack of protection is considered, that it is hard to understand why any up-to-date manager will neglect this important part of his equipment. Whether the contention in this particular case is true or not makes little difference. In fact, the case in favor of protective apparatus is made all the stronger if the plaintiff's allegation that the fire was due to the telephone wires was untrue, for in that case if the telephone company could show that it had a lightning arrester in place the suit would be practically decided in advance.

AN IMPORTANT CORRECTION.

IN the address by Mr. C. E. Wilson upon Independent telephone securities as an investment the paragraph reading "I am one who believes that the Independent interests will put the Bell out of business" should read "I am not one who believes that the Independent interest will put the Bell out of business, or that the Bell people will put the Independents out of business." The omission of the word "not" entirely changed the construction of the sentence and its meaning.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CARTY PATENT.

The American Bell Telephone Co. has in litigation now some case involving what is known as the "Carty Patent."

In order that we may be fully informed in this matter, won't you be good enough to send us at once the nature of the questions involved in this patent, as well as in the litigation? A. L. T.

THE patent to which you refer is, I believe, No. 664,175, its title "Telephone Exchange Apparatus," issued July 14th, 1896, to John J. Carty. A copy of this patent may be obtained by sending 5 cents to the Commissioner of Patents at Washington, D. C., and giving the facts enumerated above in regard to it. It consists of ten claims, the last of which I quote:

> 10. In a telephone system, the combination with a telephone line of a normally closed connection to ground at the central station containing a testing-battery, an operator's metallic circuit containing her telephone set, a ground connection from said metallic circuit, whereby said operator's telephone may be connected in said circuit with said testing-battery and a resistance included in said ground connection adapted to prevent the disturbance of the operator's telephone when in metallic circuit due to static changes passing to earth through said ground connection, substantially as described.

The suit has not yet been decided and until it is no report of it will be accessible from which I can tell the nature of the question involved.

WHO IS FIRST OCCUPANT?

Our company planned to build its line on certain streets and was given permission by ordinance of the council to do so. We notified the electric lighting company of our intention to do so and what streets we would occupy, and had actually begun to put up our poles and wires. The lighting company then commenced to put up its whole line on the same street, finishing its line before we could do any more work on account of a strike. Then we finished our line and found we were troubled with interference from the strong current of the lighting company's wires. Are we entitled to enjoin the other company from using the street on the ground that we are the first occupants? J. B. Co.

YOUR statement makes out a very clear case entitling you to relief. It was held in a similar case that a lighting company situated as your telephone company is was the first occupant. Reverse the positions and the case sustains your right to an injunction. Nebraska Tel. Co. vs York Lighting Co., 43 N. W. 126.

LIMITATION OF RATES.

Can you tell us through your paper if the constitution of the State of Illinois confers upon cities the right to regulate and fix charges for telephone service? Also if a company operating under a franchise which limits or fixes the price can legally raise those charges? What court decisions have been rendered on this subject in Illinois or in other States? S. County Telephone Co.

I KNOW of no such provision in the constitution of Illinois, and it would be an unusual clause to be inserted in the constitution of any State. A company operating under a franchise that fixes a limit to the rates it can charge is firmly bound by them and cannot lawfully charge more than is therein fixed. A franchise is in the nature of a contract between the city and the company, and, like all contracts, must be lived up to.

Aside from a constitutional provision, it is within the power of the legislature of a State to regulate the charges which may be made by telephone companies for the rental of telephones and for general telephone service and facilities, within the limits of the State, and a statute prescribing a maximum rental for such service is constitutional and valid. State v. Bell Telephone Co., 23 F., 539. Central Union Telephone Co. v. State, 123 Ind. 113, 3 Am. El. Cas. 529. Nebraska Telephone Co. v. State, 55 Neb. 627, 76 N. W., 171.

A municipality cannot regulate telephone rates, except it be given power expressly in its charter to do so. This will not prevent it from making a contract in the form of a franchise with a telephone company in which the rates are fixed. Power given to a city to "license, tax and regulate" telephone companies is not so construed to give the company power to regulate the charges for telephone service. City of St. Louis v. Bell Telephone Co., 96 Mo. 623, 2 Am. Elec. Cas. 44. Although a municipality has power to regulate and control the use of streets, yet this power will not confer upon it authority to regulate telephone charges. State v. Central Union Telephone Co., 14 Ohio, C. C. 273. Joyce, Electric Law, sections 521, 523, 525.

SENSATIONAL ARRAIGNMENTS OF COURTS.

A SENSATION was caused in Denver, Colorado, by an argument of counsel upon the motion for change of venue in a suit brought by John Hipp vs. Colorado Telephone Company, to force the telephone company to give lower rates to all of its patrons. The ground for the motion for change of venue was that the Judge was interested and prejudiced and that the counsel for plaintiff had an undue influence over the mind of the Judge to such an extent as to prejudice him against the telephone company. Plaintiff's attorney in his argument delivered a bitter arraignment of a portion of Denver's judiciary, of the legal machinery adopted in the District Court and the public utility corporations of the city. He said that these corporations were seeking to intimidate the Judge by charging that he had made places for his relatives, and that the speaker was forced to employ them when he received an appointment as assignee of the Court.

Said he, "That is the blackmailing power of the corporations. Your Honor is under the test. I demand justice in my rights under the statute to the very letter and I look to this court to get them." Judge Johnson, against whom the charges of partiality were made, dismissed the application for the change of venue, saying that he thought he was perfectly capable of giving the suit an impartial hearing. In discussing the charge the Judge said that it was true that several relatives of the plaintiff's attorney were holding positions in connection with the court, but he denied that the influence of the plaintiff's attorney had had anything to do with their appointment, and also said: "It is further charged that Messrs. Stuart & Murray, plaintiff's attorneys, have heretofore brought a number of suits against public utility corporations of this city, including the defendant company, and in each instance have made the effort, and have usually been successful, to have them assigned to my division; I have no knowledge of this charge, and this is the first time it has been presented to me. I desire to say, however, that I have never tried a case upon its merits against any of the public utility corporations in this city since I have been on the bench, covering a period of some ten years.

"Reference is made to a former case entitled Herbert George vs. the Colorado Telephone Company, wherein it is charged that I manifested unfairness in disposing of the same. I do not care to retry the case at this time, but say without any feeling of embarrassment that I tried it to the best of my ability and decided the matters therein strictly in conformity with the law as I understood it.

"I believe that the showing made is not sufficient to warrant a change of venue.

"Therefore the motion will be denied."

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IN THE OPERATING FIELD.

REPORT OF DELAWARE AND MADISON COUNTIES TELEPHONE SYSTEM.

THE recent report of the Delaware and Madison Counties telephone system shows a gratifying increase in all departments over the same periods of last year. Below will be found a statement, which compares the months of September and also for a period of nine months ending with September:

	Sept. 1904.	Sept. 1903.
Income from rentals	$ 6,526.77	$ 4,442.50
Income from tolls	1,535.84	818.82
Income from building	135.00	135.00
Allowances	48.79	32.43
Gross income	8,148.82	5,363.89
Operating charges, taxes and insurance	3,853.36	3,593.39
Net income	4,295.46	1,770.50
Interest	1,744.16	1,487.50
Surplus for stock	2,551.30	283.00

STATEMENT FOR NINE MONTHS ENDING SEPT. 30.

	1904.	1903.
Income from rentals	$55,149.33	$35,946.80
Income from building	1,215.00	1,215.00
Income from tolls	11,427.58	5,472.29
Discount	149.90	7.96
Allowances	598.82	1,070.65
Gross income	67,342.99	41,571.40
Operating charges, taxes and insurance	33,210.57	24,406.88
Net income	34,132.42	17,164.52
Interest	15,560.85	11,467.01
Surplus for stock	18,571.57	5,697.51

A NEW MAINE COMPANY.

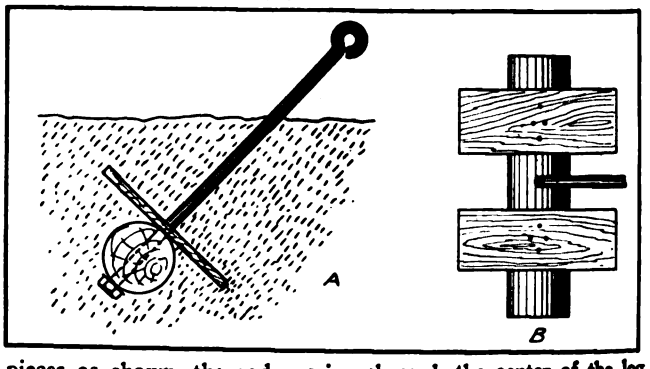
THE Union River Telephone Company, which has been organized to build telephone lines to connect up-river towns of Hancock County, has as its president and general manager for the first year Albert E. Mace, of Aurora; Dr. J. H. Patten, of Amherst, secretary, and H. T. Silsby, of Amherst, treasurer. The exchange will be located at Amherst and lines will be built to and through towns along the Union River. This new company will be of great advantage to the lumber men of this vicinity and is but the commencement for a system which will reach all of the towns in the lumber region which heretofore have been without telephone connections.

EXTENSIONS TO P. & A. SYSTEM.

ALL the important difficulties in securing rights of way for the new Pittsburg & Allegheny telephone line to Wheeling, in connection with the National telephone system, have been settled satisfactorily, and the line has been completed from Wheeling to Bridgeville. The work from Bridgeville to Pittsburg will be hurried, and it is expected that inside of thirty days the line will be in operation. This connection will open up a large and important territory covered by Independent telephones, with which the Pittsburg & Allegheny will have connection over a thoroughly modern line. Rapid work is being done also on the Pittsburg & Allegheny's new line to Butler. In fifteen days of work ten miles of this has been built, with all the material distributed. It seems probable that the entire thirty miles will be completed before Christmas. As on the other Pittsburg & Allegheny long-distance lines, a private right of way and a direct route have been obtained. This line will connect the Pittsburg & Allegheny with the Independent telephones in northern Pennsylvania, reaching the principal towns, such as Warren, Girard and Titusville. Ultimately it will be a link in the Independent route to Buffalo and other New York cities. The line to Johnstown, completed some time ago, has proved a financial success. The service given is satisfactory, and it is being used extensively by large concerns in Pittsburg and the other towns having interests in Johnstown.

TO FASTEN A GUY LOG.

WHEN guy logs are used it is important that they should be so placed as to offer the greatest resistance to a strain. The best method is illustrated in the accompanying figure. *B* represents the guy log, to which are fastened two cross



pieces as shown, the rod passing through the center of the log and fastened with a nut, as shown *f* at *a*. Its position when placed is shown at *a*, and is self explanatory.

TELEPHONE REGULATION IN SOUTH CAROLINA.

SOUTH CAROLINA has followed the lead of Louisiana and placed the regulation of telephone service within the State under the control of the Railroad Commission.

In several respects the law was found either too general or that certain sections of it failed to cover certain points, and the commission, from the decision rendered, will at the next session of the Legislature point out these defects and have them remedied. The law is particularly deficient in regard to a remedy for a raise in rates and leaves entirely too much to the judgment of the commission and the testimony of either side in the complaint.

There is now before the commission a question of the connection charges to be regulated between two systems doing business in towns close together. The matter has arisen over a dispute between two exchanges at Troy and McCormick, respectively. The commission has to take into consideration the fact that one exchange may have a hundred telephones and the other may have two hundred. It also has to consider that one may have connection with the whole surrounding country and the other may have connection with only a half dozen places.

EXTENSIONS OF UNITED STATES COMPANY.

THE U. S. Telephone Co. is making arrangements to extend its system of long distance lines from towns on the Eastern Coast to Chicago and the West. It has already secured controlling interest in a number of companies, and has traffic agreements with several others. A line is being built from Scranton to Buffalo, which will connect with Allentown, Easton and Bethlehem. By means of an agreement with the Interstate Telephone Co., towns in New Jersey will be able to reach the important cities of the Central States.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A NEW SELECTIVE SYSTEM.

ONE of the many problems which sprung up with the present widespread movement of telephony was the necessity for providing some means whereby one subscriber could automatically call another on a party line without signaling the exchange, or else to signal the exchange without calling any of the parties. Many devices have been designed to fulfil these requirements, the T. and A. Selective Call Company, of Geneseo, Ill., having just placed a practical piece of apparatus on the market which fulfils these requirements. Like other inventions, when properly worked out, this piece of apparatus is the acme of simplicity, and one is inclined to say, "why did I not think of it before?" Fig. 1 illustrates an ordinary magneto before and after conversion to this type of selective signaling. The part to which the wires are attached, shown in the left hand illustration, is a commutator so arranged as to give either positive or negative pulsations. The circuit of the sub-station generator is shown in Fig. 2, which also illustrates the strap keys by means of which either the exchange or a subscriber can be called. The only other piece of apparatus is a relay, which is so arranged as to respond to pulsations of predetermined polarity only. In its design, the manufacturers had in view that the least complication was required, so that but the slightest knowledge would be required to locate and clear trouble. With this end in view the relay is made with only three moving parts. The adjustment is based upon the action of a hanging weight; in other words, by gravitation. Only a small fraction of the current necessary to operate any other signaling apparatus is required and consequently the efficiency of the relay is very high.

This system is designed for either grounded or metallic lines as well as divided circuits. By a divided circuit is meant one in which a subscriber is able to ring the parties connected with one side of the line without disturbing those connected with the other. When a subscriber is signaling the exchange the bells of the other parties on the line are not disturbed in the least, and vice versa when the exchange is being called.

The most commendable feature of this contrivance is its adaptability to the present type of generators in use, thus eliminating the cost incidental to changing this part of the apparatus. From an operating standpoint it greatly increases the efficiency of a line, and at the same time materially reduces the time necessary to get into communication with a party on the same line, since it does away with the necessity of ringing the exchange. This system relieves the exchange operators of all necessity to watch or listen when a call is being made, since their attention is wanted only at such times as a connection is desired. It is possible to include in the circuit at the exchange an audible signal besides that made by the drop. This may be of any desired tone required, from that furnished by a buzzer to a 24" fire alarm gong. Wherever the apparatus has been demonstrated, its simplicity has been noted as a most remarkable feature, and a large number of repeat orders have been received resulting from the first one received.

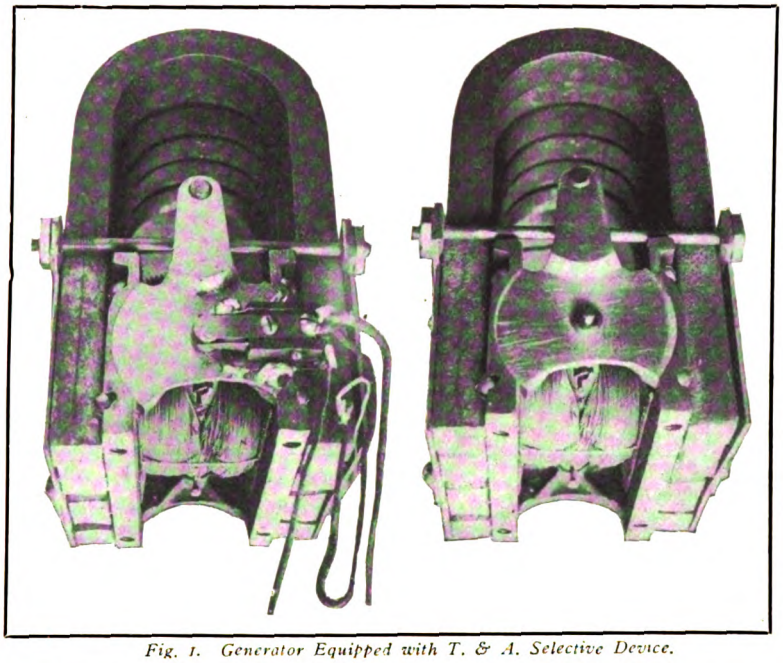

Fig. 1. Generator Equipped with T. & A. Selective Device.

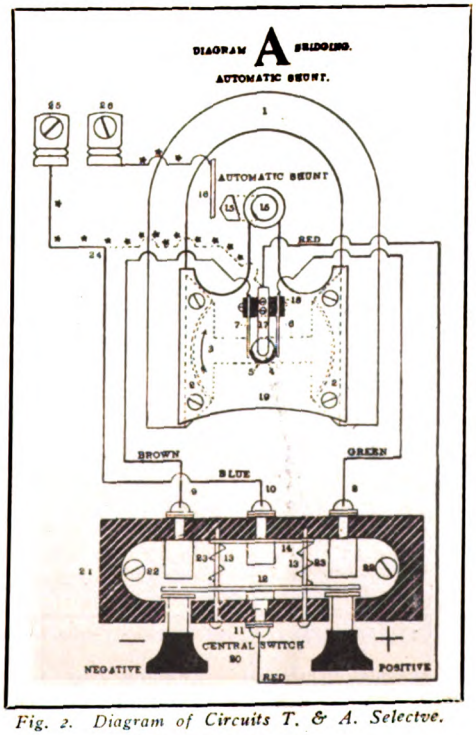

Fig. 2. Diagram of Circuits T. & A. Selective.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, of Chicago, which is rebuilding the Public Service Telephone Exchange for the municipality of Neepawa, Manitoba, Canada, has secured, in addition to its contract for central office equipment, an order for subscribers' telephones, replacing those formerly in use. When the exchange is completed it will be fully equipped with International apparatus, replacing equipment made in France.

THE GRAY PAY STATION COMPANY, of Hartford, Conn., has issued an attractive and at the same time valuable brochure entitled "The Book of Public and Measured Telephone Service Equipment." The design is unique in that it represents a large volume handsomely bound in blue colored leather. The contents are devoted entirely to the advantages of the Gray pay stations, of which there are twenty-one different types, illustrated and described, together with seven styles of registers. This company has developed the design of pay stations to the highest point of efficiency and is prepared to furnish apparatus to fit any requirements. The company will be pleased to mail this booklet to all parties interested and to furnish any additional information desired respecting its devices for registering calls and coin collecting machines

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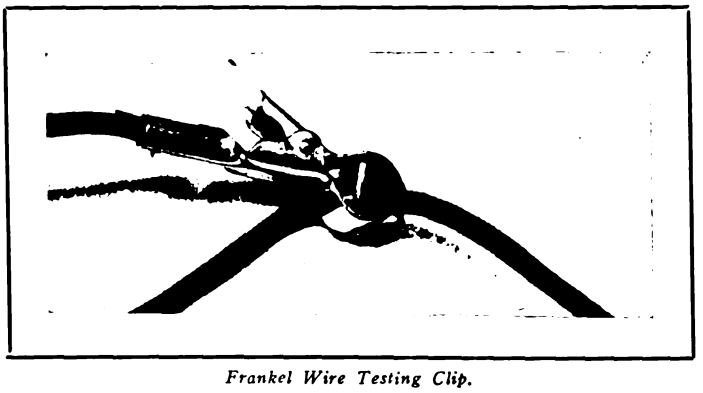
of which it has made a specialty in designing for a number of years.

A CLIP FOR MAKING TEST CONNECTIONS.

PROBABLY every one has heard of the enterprising switchboard man who was making tests of insulated wire circuits. To save himself the trouble of scraping and cutting off the insulation he stuck a pin through the insulation of each wire, the wires from the testing instrument being fastened to the pin. He thus made a quick, though far from satisfactory, test connection. Ever since that attempt, a hundred geniuses have been working to devise some quick, sure means of making a test or temporary connection with insulated wire.



Frankel Wire Testing Clip.

One has at last been patented. It is pictured herewith, and so far as known, is the only thing of the kind on the market. The half-tone cut, made from a photograph of the "Frankel Wire Testing Clip," as it is known, shows in detail the method of making a test connection. The clip, it will be noticed, consists of a snap, similar to those sometimes found on suspenders, only the spring is much stronger. The clasping ends terminate in strong teeth, and it will be noticed there is a stout, sharp-pointed pin in the center. The teeth are designed to firmly grasp the wire while the pin pierces the insulation without damage and makes a good connection with the wire. The wire is left as sound and well protected as ever.

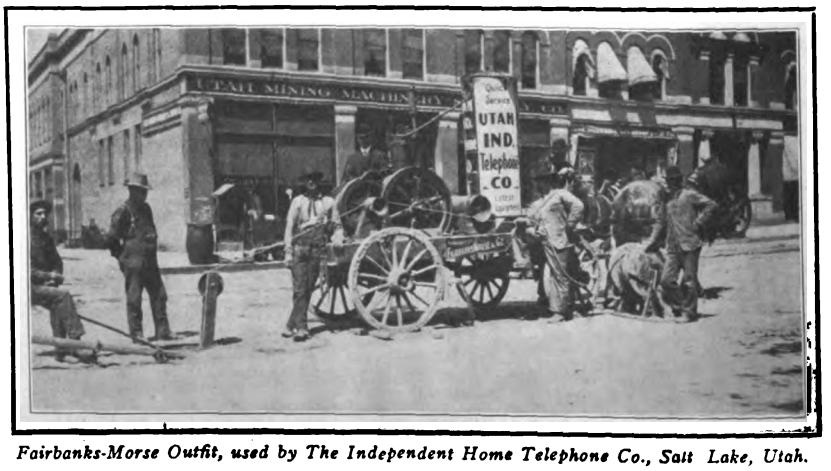
The clips are manufactured and sold by the Frankel Display Fixture Co., 718 Broadway, New York City, and already many of the largest exchanges, both Bell and Independent, are buying the clips in large quantities. The many re-orders received from such companies as the New York Telephone Company, Western Electric Company, United States Electrical Supply Co., Henderson Telephone and Telegraph Company, Henderson, Ky.; Chesapeake & Potomac Telephone Company, Baltimore, Md., and Washington, D. C.; Peninsular Telephone Company, Tampa, Fla., speak well for the practicability and utility of these clips. The Frankel Company on another page quotes prices of the clips, and offers to refund the money if a sample dozen or hundred purchased are unsatisfactory.

THE GUARANTEE TELEPHONE AND EQUIPMENT COMPANY, of Chicago, Ill., has removed from its former offices at 73-75 West Jackson Boulevard to 60-68 West Van Buren street. The company makes a specialty of re-equipping and remodeling second-hand telephones, switchboards and appliances, and putting them in first-class shape. Although it is second-hand, most of the apparatus the company sells is claimed to be just as good as new, and incidentally it is, of course, much cheaper. The company is now situated in commodious quarters and is finely equipped for handling all orders.

CABLE LAYING ENGINE.

THE cut herewith illustrates a device which affords quite a departure in the manner of laying cable. The apparatus consists of a 6 horse-power vertical gasoline engine, direct connected to a geared winding drum, actuated by a friction clutch. Both devices are mounted on one base. This makes a compact and self-contained machine, which is mounted on an ordinary platform wagon. This wagon carries a gasoline supply tank and a small water tank for cooling the engine, together with the necessary tools and apparatus used in cable laying. The operation of the machine is especially simple, after the engine is put in motion, by turning on the gasoline and pulling the engine over the dead center the engine is kept running continuously, and by means of a friction clutch operated by an end lever the winding drum can be started and stopped at the will of the operator. A small spool or nigger head is located on the outer end of the shaft carrying the winding drum. By means of these two drums it is possible to meet all of the requirements of fast and slow pulling, either for light or heavy loads.

This apparatus was recently installed by the Independent Telephone Co. at Salt Lake City, Utah, and while in that city a new world's record for laying telephone cable was established by the crew in charge. Under the direction of Chief Engineer Frank B. Hall, in 7 hours and 40 minutes, 14,719 feet of 200-pair cable were laid by a force of nine men. The best previous record was made in St. Louis in 1898 when nine men and a foreman stretched 7,556 feet of 120-pair cable in 8½ hours. Chief Engineer Hall expresses himself as believing that the above described machine is without doubt the best method of stretching cable yet discovered. The 6 horse-power Fairbanks-Morse combined vertical engine and winding gear is provided with a 16-inch drum and a 5-inch winch or nigger head. The wagon upon which the apparatus was mounted was constructed with a 3½-inch running gear, with a heavy bed made of best 6 x 8 Oregon pine. The engine is provided with a regulating device which is arranged so that it can be operated from either side of the running gear, and by means of which the engine speed can be controlled as desired. With a ½-inch wire rope fastened to the end of a large cable, and passed through the subway



Fairbanks-Morse Outfit, used by The Independent Home Telephone Co., Salt Lake, Utah.

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE—Independent magneto plant in Southern town, 3,500 population; 200 drop switchboard; 150 drops in operation; gross annual income $3,500; fixed expense $1,300; in operation five years; no competition; town and plant growing fast; price, $10,000. Address Box 255, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 255

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

FOR SALE.—Telephone Exchange in town of 850. Equipped with Stromberg board; North Telephones; 65 local subscribers; 15 party lines; good connections. Further particulars given on request. Address Everton Telephone Co., Everton, Mo. 271

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—A civil engineer. Must be a good draughtsman, methodical and accurate; familiar with cable and pole line construction and one who can handle men and meet the public in a congenial way. Position permanent; opportunity for advancement to the right man. Address L. W. STANTON, 411 Electric Building, Cleveland, Ohio. 275

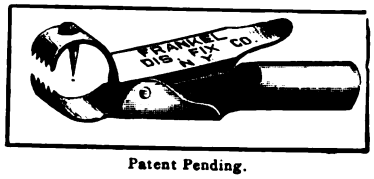
WANTED—A first-class telephone electrician having had experience from bottom up; able to handle all troubles in exchanges, both inside and outside. Well up on toll line troubles. Write giving references, etc. THE SOLOMON VALLEY TEL. CO., Beloit, Kans. 274

AM open, any time between now and March 1, for position as superintendent or manager of exchange. Am, at present, managing a system built by me, but want larger field. Fifteen years' experience in all branches of telephone business. Would accept good position other than above mentioned. Best of references furnished. Address Box 268, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 268

WANTED—Managers for two telephone plants of more than 1,000 telephones. Must have executive ability, a keen sense of modern business and be congenial in meeting the public. Address L. W. STANTON, 411 Electric Building, Cleveland, Ohio. 276

WANTED.—I am seeking a gilt-edged investment in some first-class telephone property. Not particular as to location, but must be shown before I buy. Address, Box 269, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 269

WANTED—Position by manager. At present has charge of four exchanges, common battery and magneto. Has had factory experience, building and installing complete equipment. Understands handling of men and laying out complete installations. Have rebuilt exchanges and put them on paying bases. Will be open January 1st. Address Box 277, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 277



Patent Pending.

Make a perfect circuit test without scraping off insulation or defacing or injuring cords.
That's what you can do by using our patent

WIRE TESTING CLIPS

Do you know what a saving of time will result ?

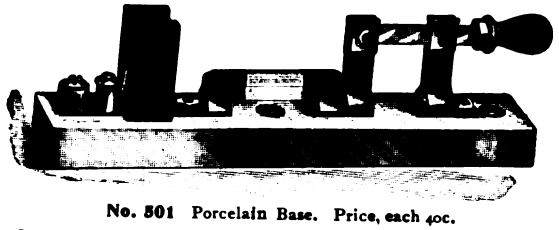
In 1 Dozen lots, 12½c. each — In 500 lots, 10c. each.
" 100 " 11c. " — " 1,000 " 9c. "

Order a Dozen or a Hundred NOW. Money refunded if not satisfactory.

One clip grips the positive and another the negative side of the circuit when testing.

FRANKEL DISPLAY FIXTURE CO.
718 BROADWAY Electric Dept. N. Y. CITY

King of Protectors



No. 501 Porcelain Base. Price, each 40c.

Special prices in quantities. Write for circular.

Harvard Electric Company
62 W. Van Buren Street, Chicago, Illinois.

A pay-station not equipped with a

Sound-Proof Booth

is like an automobile without a steering-wheel. It's of no service.
Telephone talks require privacy.
Booths pay their cost in increased receipts.

Write to-day for prices.

W. S. SEAMAN & CO.
216 Water Street, MILWAUKEE, WIS.

EXPANDED METAL LOCKERS.

LOCKERS

Open Mesh or Solid Sheet Steel Clothes Lockers and Material Closets made by us have all the best improvements and advantages

MERRITT & CO.
1010 Ridge Av., PHILA.

Please send a { Catalogue / Sample of Metal

To _____

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to the engine, a pull of any distance can be made. As much work has been accomplished by the use of the above described apparatus in five minutes as would have been accomplished formerly by four men in two hours. It would appear that from the description and the records, that an apparatus of this kind would find great favor among many of our larger telephone companies. For details address the makers, Fairbanks, Morse & Co., Chicago, Ill.

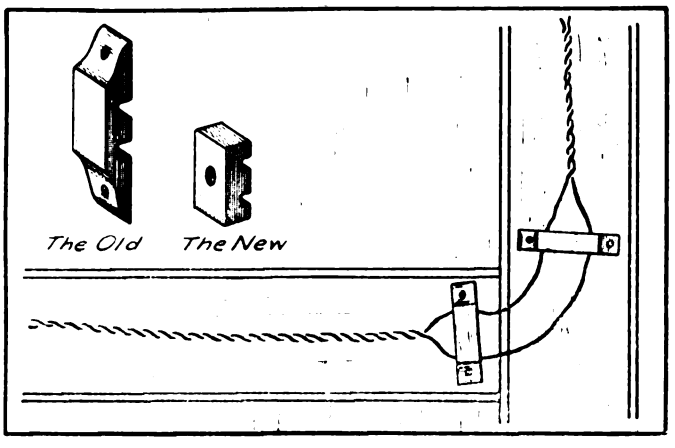

Fig. 1. Wiring With Wooden Cleats.

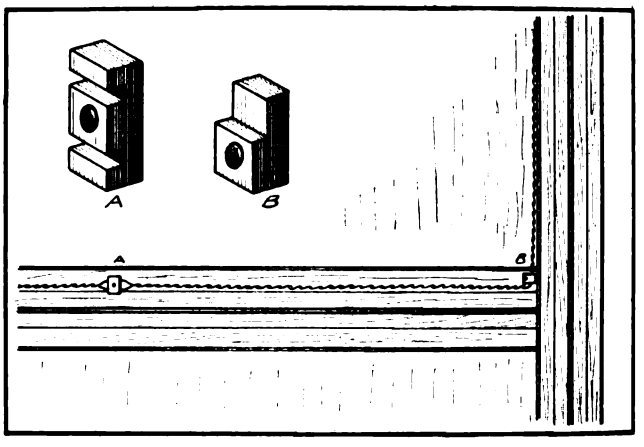

Fig. 2. Wiring With Hard Fibre Cleats.

A HARD FIBRE CLEAT.

THERE is an old adage, the moral of which is that it is the little things in this world that count most. One of these "little things" directly applicable to the telephone business has recently been called to the attention of telephone men. It is the "Morris Hard Fibre Cleat," manufactured by the Morris Electric Company, Fourth and Shipley streets, Wilmington, Delaware. In recent years no one specialty has probably been placed on the market that appeals to the up-to-date and economical telephone manager to such an extent as does this cleat. It was designed particularly to take the place of the clumsy and unsatisfactory wooden and porcelain cleats, and it has proven itself equal to the task.

In Figures 1 and 2, respectively, are shown drawings of inside wiring run with the old wooden or porcelain cleats, and the new Hard Fibre Cleat. Comment is unnecessary as to the results.

These fibre cleats possess many advantages. They are very much smaller than either wooden or porcelain cleats, which fact alone enables an ordinary installer to make a practically concealed job of wiring. The cleats being made of fibre are, of course, perfect insulators, and they will never break. This latter point will appeal to all managers that appreciate the importance of "saving the pennies." The prices for these cleats are no more than for ordinary porcelain and cheaper than wooden cleats.

They are made in three colors, red, gray and black, to harmonize with different styles of woodwork and interiors. Several styles are made: for corners, two wires, twisted pairs and three wires. Already many of the largest Bell and Independent exchanges have adopted these fibre cleats as standard.

Samples and particulars may be had by addressing The Morris Electric Company, Fourth and Shipley streets, Wilmington, Del.

THE CENTURY TEL. CONS. Co. has received an order from the Northwestern Tel. & Teleg. Co. for a local and toll switchboard for its Carthage exchange, which will make four switchboards furnished this company within a month.

A NEW BRACKET TELEPHONE.

ILLUSTRATED on this page is the "Skelleyphone," a new device intended to "lighten the white man's burden." The Skelley Mfg. Co., 50 High street, Cleveland, Ohio, in announcing the "Skelleyphone," states that it is "trial worthy," and that it is "an extension arm telephone that saves time, trouble and temper." We all know that such a device interests the up-to-date manager. The "Skelleyphone," as illustrated, consists of a receiver, transmitter and hook switch, mounted in the usual way on an upright stand. This stand is similar to the ordinary desk stand, with the exception that the base is removed. The upright is then fastened to a double swinging arm. This arm may be attached to either a roll or flat top desk, table, stand, or the wall.

Parts of the "Skelleyphone."

All of the working parts of the "Skelleyphone" are so constructed that by the loosening of one screw all inside parts are readily accessible. The opening of this screw brings before the troubleman or inspector every part of the telephone, so that he can readily see that all springs are making contact, that all wires are in good condition, and that all cord connections are securely fastened and under their proper binding posts.

By means of a special fastener formed in the fiber base block the receiver and pedestal cords are held in position, so that no pull or jerk can in any way affect their contact connections.

The swinging arm used on the "Skelleyphone," to always insure that the telephone is at hand ready for use, yet never in the way, is the same as the desk-set bracket made by the Skelley Mfg. Co. One of the novel features of these brackets is that they are made

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Style "C." (Exact Size.)

For Corners.
Price $4.00 per 1000.

New Orders and Re-Orders

are coming every day for

Style "B." (Exact Size.)

For Twisted Pairs.
Price $4.50 per 1000.

The Morris Hard Fibre Cleats

One customer says: "They are worth their weight in gold."

Another: "They save half the time of my men."

Still another says: "They give inside wiring effects that harmonize with the most beautiful interiors."

And yet another: "That he figured the *cleats had cost* him *nothing,* because they had done away with the item of replacement that figures heavily with breakable wooden and porcelain cleats."

Perfect insulators. Never break or split. Smaller and neater and cheaper than any other. *If you have not seen them write to-day for free samples.* Made in three colors, red, gray, black. Specify color, otherwise we will send red.

"Style A." (Exact Size.)

For Twin or Parallel Wires.
Price $4.30 per 1000.

MORRIS ELECTRIC CO.

Fourth and Shipley Sts., WILMINGTON, DEL.

Manufacturers of Fibre for Electrical Purposes.

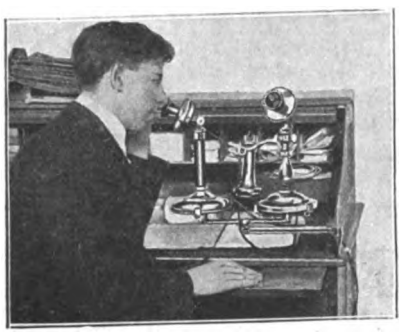
"Style D." (Exact Size.)

For Three Wires.
Price $6.50 per 1000.

The Skelleyphone.

An Extension Arm Telephone.
Can be used on any circuit.

Skelley Telephone Holders.



For Two Telephones.

For One Telephone.

Bases for Wall, Roll or Flat Top Desk, any Desired Extension, Oxidized Copper or Nickel Finish.

Write us now.

Skelley Manufacturing Company,
Cleveland, O.
50 High Street,

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to hold two telephones. This will be appreciated by patrons of two telephone companies, or in offices that have an intercommunicating system in addition to the regular telephone service. Either telephone may be lifted from this double bracket without unfastening any screws, and the telephones may be swung in any direction without entangling the cords. As a proof of the recognized superiority of the Skelley bracket telephone the following letter has been received from O. F. French, general manager of the Cuyahoga Telephone Company, of Cleveland:

> "GENTLEMEN:—Since we have introduced your so-called 'bracket' desk telephone, the demand for them has been rapidly increasing.
>
> "In my mind this type of telephone is more convenient for a business man's desk than any other in the market today. We are also very well pleased with the workmanship of the instrument, the maintenance of same being very low. Your extension arm bracket, of which we have several hundred in use, is deserving of widespread use. In this bracket grace of outline and strength are so combined as to produce a most satisfactory bracket."

The Skelley Mfg. Co. will be glad to furnish full particulars and prices on any of its apparatus, and will send its catalogue on request. Further particulars and illustrations will be found in its advertisement in this issue.

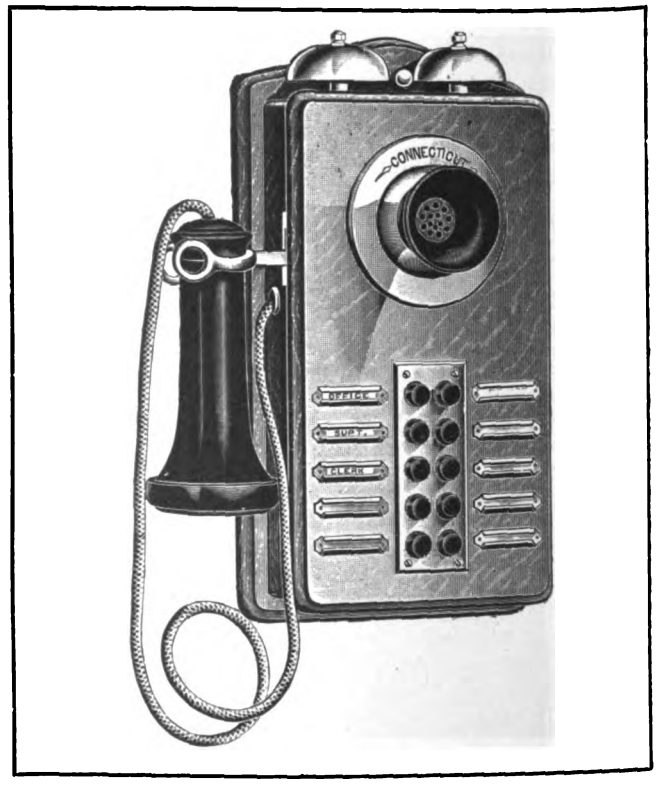
FRANK B. COOK, 240 West Lake street, Chicago, Ill., is conducting experiments at Lewis Institute on new protective devices, which he says will practically revolutionize the present system, as they are along entirely new and different lines.

G. M. GEST, the expert subway contractor of New York and Cincinnati, has been awarded by the jurors at the St. Louis Fair the highest award for conduit construction.

NEW AUTOMATIC BRANCH EXCHANGE TELEPHONE.

THE Connecticut Telephone and Electric Company, of Meriden, Conn., realizing the increasing possibilities of branch exchange equipments for business houses, etc., have brought out an automatic system which is designed for branch office exchange work in connection with both magneto and common battery city service. While the branch exchange has come into more general use in the past two years, it is still an acknowledged fact that the rental of the ordinary switchboard and telephone instruments is far above the means of the average business house. Again there is the continual expense of an operator. The instrument shown is automatic, that is, each party makes his own connections.

A party wanting any other department of a factory or offices has simply to push down the button corresponding to the department wanted. The pushing down of this button automatically cuts in the party and calls; when the conversation is finished and the receiver is returned to the hook the party called is automatically cut off the line. This system is particularly well designed for connection to common battery city service. No. 1 button can be designated as the exchange button throughout the system if outside service is desired. To call central you have simply to press down the exchange button and remove the receiver in the regular way, thus making the light burn at central. When conversation is finished the button is automatically reset to its former position, thus you have intercommunication between any department or offices in the building in which this exchange is installed, as well as automatic and city exchange connection from any point without the expense of a central operator and switchboard. The construction of this instrument is very simple. All connections are made on hard rubber and the transmitter, receiver and working parts are of the very best design. The switching device is built to stand heavy use and all kinds of heat and cold conditions. The trip is of case hardened steel and there is no possible chance for wear. For this as well as in the branch switchboards one or two trunk lines extending to the central office is amply sufficient to take care of all outside traffic. Owing to the simplicity and low cost of this automatic system it will evidently,



Connecticut Automatic Telephone.

to a large extent replace the old switchboard equipments for branch exchanges in buildings. This system can be installed at an exceedingly moderate price and the annual expense to the subscriber should be very much decreased as the operating expense and the cost of the installation to the telephone company is certainly greatly diminished over the switchboard equipment. The very reasonable cost of maintenance of this system will enable hospitals, business houses, residences, etc., to install it, thereby greatly increasing the revenue to the telephone company, and thereby securing a trade which heretofore could not be reached. Full information will be furnished by the Connecticut Company on request.

THE MEDORA MILLING COMPANY, Medora, Ill., is distributing some blotters which, besides being of value to the office force, draw the attention of managers to its stock of chestnut poles. This company is in an exceptional position to furnish any quantity of poles of any desired size at a moment's notice and will be pleased to correspond with any parties desiring information.

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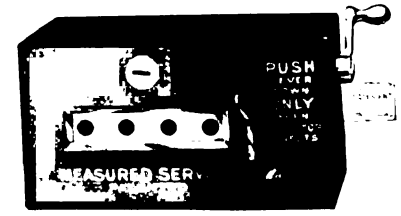
Credit is the most powerful leverage to productive capacity

This meter, which records both at the subscriber's end and at Central, is the only one which permits of credit with complete satisfaction to the subscriber.



No disputes. *No collectors.*

Measured Service Co., 153-161 S. Jefferson St., CHICAGO

SUBSCRIPTION BLANK

Cut this out and enclose with a Postoffice or Express Money Order or A DOLLAR BILL, at our risk.

.....1904

American Telephone Journal
116 Nassau St., NEW YORK

Enclosed find.. .....for One Dollar ($1.00)
Subscription for One Year.

Name.....

P. O. Address.....

MR. MANAGER:

Do you ever wonder how you can handle Rural Lines so as to give Subscribers satisfaction at a profit to the Company?

Do you realize that to give Rural Subscribers satisfaction you must, *first of all*, have "Central" answer their first call instantly.

Do you think you cannot do this unless at an increased operating expense?

You can handle more of these lines, by using

The T. & A. Selective "Central" Relay

with the operators you have and give incomparably better service.

Our system is for either Ground Lines, Straight Metallic or "Divided Circuit" Metallic Lines.

You do not have to Purchase New Telephones

WRITE TO-DAY FOR PARTICULARS AND PRICES

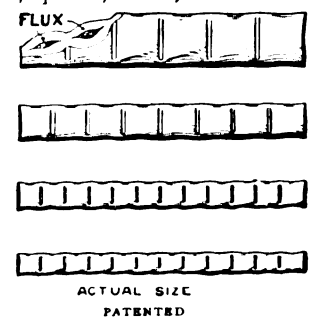
The T. & A. Selective Call Co.

Sole Manufacturers GENESEO, ILL.

If you want solder that will flow quickly and surely to place and leave smooth work without losing time in preparing or applying flux acid, get

Kester Self-Fluxing SOLDER

Clean to handle, quick, sure, economical and convenient.



Made in four sizes and with various fluxes,—"Kester" rosin, stearic acid, etc.

SEND FOR FREE SAMPLES

L. F. MAHLER CO., R. 208, Chemical Bldg.
ST. LOUIS, MO., Gen. Western Agents

KESTER ELECTRIC MFG. CO.
52 No. Union St., CHICAGO, ILL.

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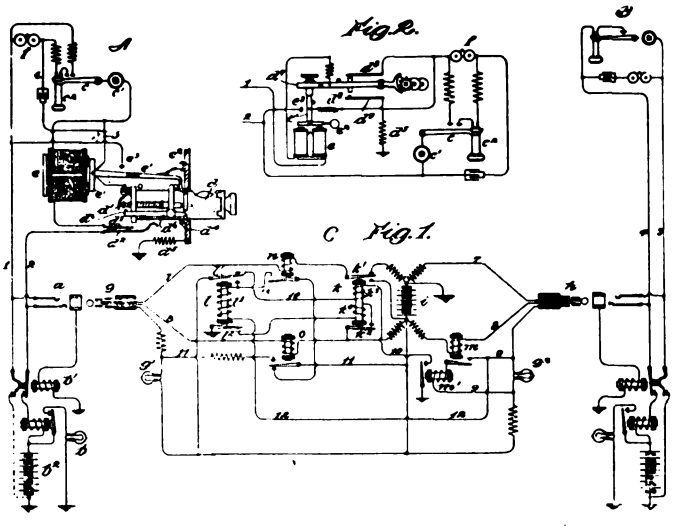
TELEPHONE PATENTS

IMPROVED TELEPHONE TOLL LINE SYSTEM.

W. W. Dean, of Chicago, Ill., patents (No. 771,972) an improved telephone toll line system, and assigns to the Western Electric Company. The object of this invention is to provide a toll line device consisting of a coin receiving box in which the subscriber must deposit a coin in order to connect with the central office, and a register for recording each connection. The circuit of the system is shown in the accompanying illustration. Its operation is as follows: The subscriber signals by depositing



a coin in the coin receiver *d*. This closes the circuit of limb *2* to ground, at *d'* through magnet *e*. Current from *b2* through line relay over limb *2* through magnet *e* to its armature and contact spring *d'* to plunger coin receiver thence to ground, exciting line relay and signaling the office. The direction of the current is such that the armature of the polarized magnet is not moved. When the operator answers, the subscriber gives his order in the usual manner. In removing his receiver he has closed a bridge over the line in the usual manner, the contact *e3* being opened and the contacts *d2* and *d3* closed. The magnet *e* is unaffected by the substitution of the battery *i* for the battery *b2* since the polarities are the same. The supervisory signals *n* and *o* are excited by the current over the conductor *7* to limb *l* through the substation and magnet *e* back over limb *2* and conductor *8* to the negative side of the battery. When subscriber at *B* answers, he bridges conductors *3* and *4*, closing circuit through supervisory relay *m'*. This relay in drawing up its armature, closes a circuit to ground from the free pole of the battery *i*. This circuit including armature *l'* and back contact of relay *l*, conductor *10*, and magnet *K3* of switch *k*. Current in the winding *k3* attracts the armatures *k'* and *k2*. The armature *k'* transfers connection from conductor *7* to the free pole of the battery *i*, armature *k2* completes path to ground from side *8* of plug circuit, including the retaining winding *k4*, controlled by armature *l2* of relay *l*. Current flowing through winding *k4* keeps magnet excited. The operation of the electromagnet switch *k* reverses the current through magnet *e* and prevents the use of the telephone till the subscriber operates the toll device.

As conductor *7* is connected with free pole of battery *i*, the circuit is over limb *1*, through magnet *e*, conductor *2*, spring jack conductor *8*, relay *o*, to point where armature *k2* is tapped on, thence through winding *k* to ground by armature *12*; also from battery *i* through one winding of the repeating coil to armature *k2*, but enough current flows through the substation to operate relay *e*.

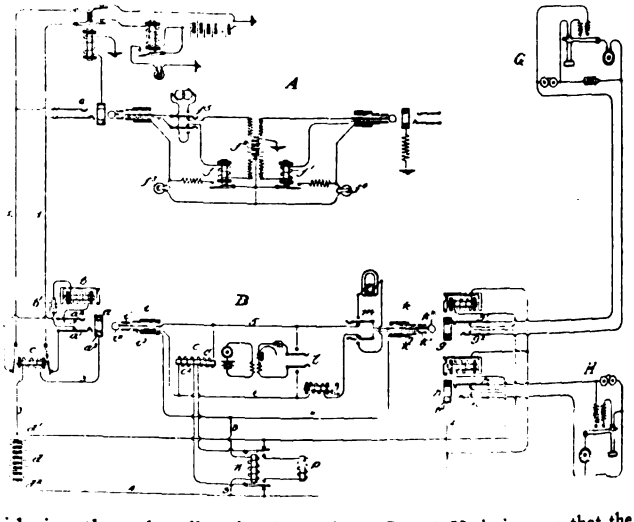
It will be noted that the current through *e* has been reversed. The armature *e'* will swing counter-clockwise and close contact *c3*, short-circuiting the telephone, display signaling *c2* and removing the obstruction from the coin receiver *d* so that it may be operated. The calling subscriber will then push the button, depositing the coin in the box and may proceed with his connection.

ANTISEPTIC APPLIANCES.

H. L. Cutter, Los Angeles, Cal., patents (No. 771,128) a hygienic attachment for telephone transmitters. The object of this invention is to provide an improved hygienic mechanism for telephone transmitters. This is accomplished by means of a small light frame-work that supports a roller carrying a strip of sterilized paper. The frame-work is secured to the transmitter by being clamped in the rubber mouthpiece in such a manner as to enable the strip of paper to be drawn in front of the mouthpiece. As fast as the paper is used it may be torn off and renewed.

PRIVATE BRANCH EXCHANGE SYSTEM.

J. L. McQuarrie, of Chicago, Ill., patents (No. 772,900) an improved private branch exchange system and assigns to the Western Electric Company. The object of this invention is to provide a circuit for private branch exchanges which are operated upon the common battery plan so arranged that those subscribers who are authorized to obtain regular exchange service can do so while the private exchange subscribers can only talk among themselves. The circuit of this invention is shown in the accompanying diagram, in which the central office is shown at *A*, the private branch exchange at *B*, and two subscribers at *G* and *H*. The trunk line which extends between the private branch exchange and the central office is indicated by *1 2* and terminates in the private branch exchange in the line springs *a' a2*, including a signal *b*, the circuit of which is opened by a condenser. The continuity of the trunk line conductors *1 2* is controlled by the blocking relay *c*. Normally the armatures of this relay maintain the continuity of the trunk line, but the winding of this relay is included in a local circuit from the ring of the jack *a3*. Con-



sidering the subscribers' sub stations *G* and *H*, it is seen that the sub station *G* has no third wire to the ring of its jack, while the sub station *H* has, hence when the plug *k* is inserted in the jack *h* of the subscriber *H*, current flows through the conductor *3* of blocking relay *c* and opens the trunk line, consequently subscriber's line is open and he cannot talk to the main exchange, but in the case of subscriber *G* there is no battery connection from the ring of the jack, consequently these subscribers can converse among themselves and obtain exchange service as well.

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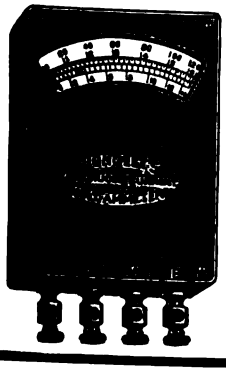

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THE WEEK'S MESSAGES

FINANCIAL.

MARSHALL, MICH.—The Marshall Telephone Company has increased its capital stock from $15,000 to $50,000.

CLEVELAND, OHIO.—The United States Telephone Company has filed a trust deed in favor of the Cleveland Trust Company, covering a mortgage for $1,000,000 5 per cent. gold bonds.

ELLSWORTH, WIS.—The Pierce County Telephone Co., of Ellsworth, by its president, F. M. White, and secretary, W. H. Currier, has caused its capital stock to be increased from $10,000 to $30,000.

FRANCHISES.

MANITOU, COLO.—An ordinance granting a telephone franchise to H. C. Kinsman and M. H. Spere, of Colorado City, has been introduced and is under consideration.

DALTON, GA.—The Union Development Company has made an application for a charter in Whitfield County to operate a telephone system.

AVERYVILLE, ILL.—The Interstate Independent Telephone and Telegraph Company, of Peoria, has applied for franchise in this town.

SKOWHEGAN, ME.—The Central Maine Telephone Company has applied for a franchise to enter this village.

LACONIA, N. H.—The Citizens' Telephone Company, of Laconia, is extending its system to Alton Bay and will ask for a franchise in Farmington.

BURBANK, S. D.—T. S. Maude, of Burbank, has applied to the county commissioners for a franchise to operate and construct a telephone line through Union County from Burbank to Spink.

DALLAS, TEX.—F. B. McElroy, who for some time has been endeavoring to secure an Independent telephone franchise in Dallas, has stated that he would contribute the funds necessary for holding a special election to decide whether the voters of this city desire an Independent telephone system. If the voters should decide favorably, there is very little doubt that the council would grant such a franchise.

CARMEL, WEST VA.—The Carmel Telephone Company has made application to the town council for a franchise to construct and operate a system in that place.

ELECTIONS.

RUSHVILLE, IND.—At the recent annual meeting of the Rushville Co-operative Telephone Company, the following directors were elected: H. E. Barrett, W. D. Root, B. L. McFarlan, T. M. Green. The secretary's report shows receipts for the year in excess of $15,000, with disbursements of $14,664, the balance being $440.13.

CLEVELAND, OHIO.—The directors of the Federal Telephone Company, at a recent meeting, re-elected all the old officers for the ensuing year, as follows: F. S. Dickson, president; E. W. Moore, vice-president; James B. Hoge, second vice-president and secretary; R. W. Judd, treasurer.

CHARLESTON, OHIO.—F. L. Beam and Cyrus Huling have been elected directors of the Home Telephone Company, of Charleston.

GENEVA, OHIO.—The Madison Telephone Company at its annual election re-elected President Charles De Veau and the other officers.

CHARLOTTEVILLE, VA.—At the annual meeting of the Albemarle Telephone Company, the following officers were elected: T. W. Twyman, president; J. B. Andrews, vice-president.

COMBINATIONS.

FLORA, IND.—The stockholders of the Flora Co-operative Telephone Association have voted to purchase the John Q. Miller Telephone Plant, which has been in operation in Flora for some time, thus forming a consolidation of the two telephone systems which have been operated in Flora.

SAYBROOK, ILL.—Robert Means has purchased the Saybrook Telephone Exchange, and Howard Means, his son, will take possession. The new company will be known as H. R. Means & Co.

FAIRBURY, NEB.—C. W. Bartlett has purchased an interest in the Fairbury Telephone Company and has taken charge of the exchange.

LYONS, N. Y.—It is rumored that the Wayne Telephone Company, of which the Lyons Telephone Company is a branch, will consolidate with the Wayne-Monroe Telephone Company.

NEW COMPANY NOTES.

SELMA, ALA.—The Mapleville & Selma Telephone Company has been incorporated with a capital stock of $4,000. The incorporators are: N. H. Ryder, L. C. Elebash, E. E. Todd, T. M. Crumton, E. G. Ensign, W. C. Dyer.

SANTAMONICA, CAL.—The Home Telephone & Telegraph Company, of Santamonica and Ocean Park, has been incorporated with a capital stock of $250,000.

COLORADO CITY, COLO.—The El Paso Telephone Company has been established with a capitalization of $500,000, for the purpose of building a telephone system through the counties of El Paso, Teller, Fremont, Pueblo, Douglas and Denver. The principal organizers of the company are: M. H. Spere, N. B. Hames, C. D. Taylor.

MANSFIELD, ILL.—The Mansfield Mutual Telephone Company has been incorporated and a plant will be built in Mansfield and vicinity, operating 200 telephones. The following officers have been elected: Howard Nash, president and secretary; W. H. Burns, treasurer; and John Churchill, Samuel Howe and Charles Gordon, directors.

CLARE, IA.—The Farmers' Mutual Telephone Association, of Clare, has been organized by W. S. Lyons, Gust. Baumchen, J. M. Hood, J. J. Condon and Henry Haulwick, of West Jackson, and D. S. Cougholn, G. C. Voigts, P. H. Cain, Bert Schuster, J. McElroy and J. D. Hood, of Deer Creek.

CLINTON, IA.—The Twin City Telephone Company has been incorporated with a capital stock of $600,000.

DUNKERTON, IA.—The Blakeville Farmers' National Telephone Company, of Dunkerton, Black Hawk County, Ia., has been incorporated with a capital of $5,000. The officers are: President, C. W. Smith; vice-president, Martin Rinderknecht; secretary, William Rodger; treasurer, Sidney Weick.

JEFFERSON, IOWA.—The Star Telephone Company has been incorporated to build a telephone line. B. Curtis is president and J. S. Neil treasurer.

ROCKWELL, IOWA.—The Rockwell Telephone Company has been incorporated with a capital stock of $25,000 by E. N. Egge and others.

PEKIN, KANS.—The Pekin Telephone Company has been incorporated with a capital stock of $4500.

ELLSWORTH, ME.—The Union River Telephone Company has been incorporated to build telephone lines in Hancock County. Albert E. Mace, of Aurora, is president and general manager, and Dr. J. H. Patten, of Amherst, secretary; T. Silsby, of Amherst, treasurer.

NEWTON, MICH.—The Newton & Le Roy Telephone Company has been organized to build telephone lines in these townships. The principal stockholders are E. C. Cory, J. A. Herd, Henry Randt and others.

GOOD THUNDER, MINN.—The Pride Telephone Company has been organized and will construct a line into Good Thunder.

ARCHER, NEB.—The Archer Telephone Co. has been incorporated with a capital stock of $50,000 to construct and operate a telephone system in this village. The directors are A. J. Harshberger, J. B. Templin, Wm. Johnston, H. G. Mithofer and F. F. Wagner.

CORTLAND, N. Y.—The Otsetlic Valley Telephone Company has been incorporated with a capital stock of $4,000. The directors are: W. J. Wildman, E. T. Potter, P. C. Wheeler, J. M. Lotridge, M. L. Halbert, A. Fowlston and J. H. Murray.

JOHNSONVILLE, N. Y.—The Johnsonville Telephone Company has been incorporated with a capital stock of $500 by J. D. Van Wert, G. I. Hanna and E. H. Abbott, all of Johnsonville.

WINDSOR, N. Y.—The Lester Telephone Company has been incorporated with a capital stock of $2,000 by Wilber Brink, Levi Uresson and J. E. Kent, of Windsor.

UTICA, N. Y.—Sholes, Ferris & Foley are drawing articles of incorporation of the Independent Telephone Securities Company, which will have headquarters in Utica. The company will have a capital stock of $800,000 and an authorized bond issue of $15,000,000. The directors are as follows: Thomas W. Finacune, of Rochester; Frederick W. Zoller, secretary of the Union Trust Company of Rochester; George R. Fuller, manager of the Rochester Telephone Company; Charles H. Poole and T. Harvey Ferris, of Utica.

CHESTER HILL, O.—The Chester Hill-Brown's Mill Telephone Company has been incorporated with a capital stock of $3,000. The incorporators are Fred McInturf, E. Hopkins, H. S. Hopkins, J. M. Russell, T. J. Edgerton.

COLUMBUS, O.—The New Lebanon Telephone Company, of Montgomery County, has been incorporated with a capital stock of $10,000.

MARIETTA, OHIO.—The Barlow & Watertown Telephone Company has been incorporated with a capital stock of $10,000 by S. W. Harvey, R. Wolcott, H. Fisher, L. A. Fisher and J. Fisher to operate telephone lines in Washington and Morgan Counties.

NEW LEBANON, OHIO.—The New Lebanon Telephone Company has been incorporated with a capital stock of $10,000 by D. C. Mills, V. E. Weaver, G. C. Smith, G. W. Hepner and S. P. Dihl.

INDEPENDENCE, ORE.—The Independence Telephone Company has been incorporated with a capital stock of $500 by Dr. O. D. Butler, W. A. Messner and J. R. Craven. The company will build a line to Monmouth and will connect with the Louisville, Airlie, Fall City and Dallas lines. A central office will be installed here.

PERRYSVILLE, PA.—The Perrysville Telephone Company has been organized to build a telephone line between Genesee, New York, and West Bingham, Pennsylvania.

PLAIN GROVE, PA.—The Plain Grove Telephone Company is being organized with a capital stock of $5,000 by J. B. Humphrey, N. A. Offutt, W. J. Offutt, M. W. Keener and W. B. Rodgers.

LEXINGTON, S. C.—The Citizens' Telephone Company, of Lexington, has been incorporated with a capital stock of $1,000 by J. E. Coughman and A. J. Fox.

BROWNWOOD, TEX.—The West Texas Telephone Company has been incorporated with a capital stock of $100,000 by C. C. Woodworth, J. A. Walker and others, of Brownwood.

BEDFORD, VA.—The Southside Rural Telephone Company has been organized with a capital stock of $10,000. A. J. Gillaspie, president; Dr. S. H. Price, vice-president; H. Pollard, general manager, and J. M. Speece, secretary and treasurer.

WAITSBURG, WASH.—The Waitsburg Rural Telephone Company has been organized with the following officers: J. W. Morgan, president; Gus Vollmer, vice-president; W. B. Brooke, secretary; A. W. Phillips, treasurer; E. M. Denton, Walter Price and Frank Jonas, trustees.

BLAINE, WIS.—St. Croix Farmers' Mutual Telephone Company, of Blaine, has been incorporated with a capital stock of $3,000. The incor-

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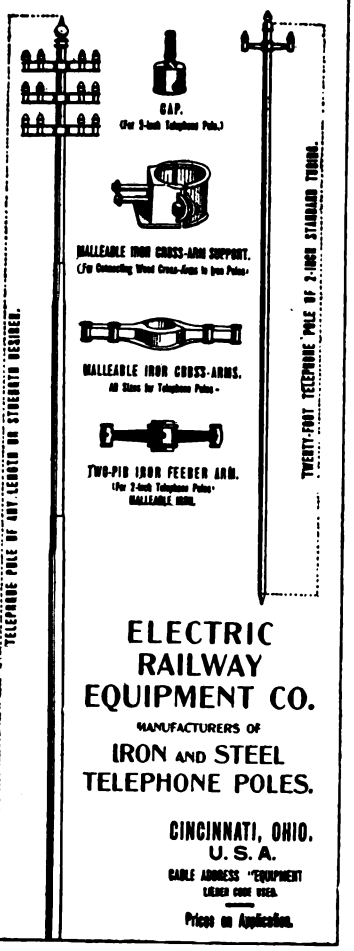

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porators are C. H. Chipman, H. B. Dunn, L. T. Fournier, J. V. Carter and Richard Goldschmidt.

PERSONAL.

L. BARNES has severed his connection with the Southern Bell Telephone Co., at Columbus, Ga., and gone with the Automatic Telephone Company, of Columbus.

W. T. BELT has been promoted to the position of superintendent for the Nebraska Telephone Co., in Nebraska, South Dakota and Western Iowa.

J. R. CARTER has been appointed manager for the Nebraska Telephone Co. in South Omaha.

MISCELLANEOUS.

WILMINGTON, DEL.—The Delmarvia Telephone Company will install an automatic switchboard which will have an ultimate capacity of 10,000 lines.

JACKSONVILLE, FLA.—The Independent telephone plant has been sold to D. T. Gerow.

TIFTON, GA.—The exchange of the Tifton Telephone Company was recently severely damaged by fire.

CRAWFORDSVILLE, IND.—The Home Telephone Company has issued a new telephone directory, containing 1,600 subscribers and 1,100 toll connections.

PEKIN, ILL.—The New Independent Telephone Company is completing the work prescribed by the city council and had returned to it the $20,000 forfeit which the company had put up.

CALAIS, ME.—Forest City Telephone & Telegraph Company has effected a working agreement with the West Isles Telephone Company, of Deer Island.

WESTBROOK, ME.—The Northeastern Telephone Company has applied for pole and conduit privileges in this city.

GREENFIELD, MASS.—The Heath Telephone Company has established a toll station in this city.

SPRINGFIELD, MASS.—The Heath Telephone Company has rejected the proposition of the New England Telephone Company, whereby it was to abandon Shelburne Falls and replace its transmitters and receivers with those of the New England Company.

BATTLE CREEK, MICH.—The Citizens' Telephone Company has installed its new automatic switchboard, which is equipped for 1,000 telephones. A complete test has been made of every part of the apparatus, and the company has established a trouble department consisting of five men who have received a thorough training at the hands of experts from the Automatic Electric Telephone Switchboard Company, of Chicago.

GLENCOE, MINN.—The Norwood Young America and Cologne Telephone Company is now in full operation.

SHELTON, NEB.—At a meeting of the representatives of the Independent companies of Central Nebraska, the Central Nebraska Toll Association was organized. Fourteen Independent companies were represented, having a total of 6,000 telephones, and operating nearly 500 miles of lines. The companies represented operate in Hamilton, Hall, Buffalo, Custer, Dorson, Phelps, Adams and Furnas counties.

MULLICA HILL, N. J.—The Rural Telephone Company will open its line for business in the near future.

HANNAFORD, N. D.—Twenty-seven subscribers have been secured for the local telephone exchange.

OAKLAND, ORE.—The Oakland Development League is considering the matter of installing a local telephone system. Hon. A. F. Stearns is interested in the matter.

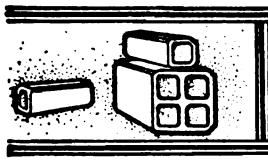
KENOSHA, WIS.—The Citizens Telephone Company is about to issue a joint directory which will contain the names of subscribers in Kenosha, Racine, Bristol, Pleasant Prarie, Somers, Winthrop Harbor and connecting lines.

UNDERGROUND.

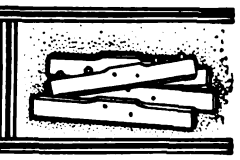
LOS ANGELES, CAL.—The Home Telephone Company is extending its underground system in this city.

ST. PAUL, MINN.—The Twin City Telephone Company has taken out a permit for underground conduits on certain streets.

AUBURN, N. Y.—The street department has cut many of the lines of the Automatic Telephone Company, which were overhead in the underground district of the city. The company will now have to place its lines in that section in underground conduits.



New Construction in the Field



HUNTERSVILLE, ALA.—The Huntersville Telephone Company is going to install a new switchboard.

RIVERSIDE, CAL.—The long distance line from Riverside to Los Angeles and other California cities, will be completed within the near future.

LODA, ILL.—J. E. Fitzsimmons is building a farm telephone line for W. C. Gress, of Loda.

PEORIA, ILL.—The Interstate Telephone Company is making arrangements to construct lines to Matteson, and install an exchange at that place.

COLUMBUS, IND.—The New Long Distance Telephone Company is preparing to build a line between this city and Hope.

CRAWFORDSVILLE, IND.—The new metallic long distance circuit from this city to Indianapolis has been completed. There are now three lines connecting this city with Indianapolis and other long-distance points.

MONROE, IND.—Dr. F. M. Parish is building a line to Steele and will also construct a line south from this village.

MARSHALLTOWN, IA.—The Kiron Telephone Company has extended a line into Boyn.

BRAZILTON, KANSAS.—The Hepler Mutual Telephone Company is extending its system to Walnut, and from Farlington to Gerrard. Lines will be built from Walnut to St. Paul and from Brazilton to Farlington.

NEWBURG, ME.—The Unity Telephone Company is extending its system in this vicinity.

COOLEYVILLE, MASS.—The Highland Telephone Company is extending its system to Locks Village and Wendell.

BATTLE CREEK, MICH.—The Citizens' Telephone Company has decided to extend its lines to Manwataka, Boon and Henrietta, in Wexford county, and it is expected that the company will be in operation in the three villages by the beginning of next year.

HART, MICH.—The stringing of the second copper wire between Muskegon and Hart has been completed. Work was begun last spring by the Citizens' Telephone Company, of Muskegon, and carried as far as White Hall by that company. The remainder of the distance has been finished by the Lake Shore Telephone Company, of Oceana county.

MILFORD, MICH.—The extension of the Milford Rural, west from McCullough's, has been completed, and work has started on a line north to the Highland road connecting with a number of rural telephones. Other contracts are also being made at a satisfactory rate, and the telephone system is being developed rpidly.

BRAHAM, MINN.—The Maple Leaf Telephone Company has completed a line running from Stanchfield through Elm Park.

GAYLORD, MINN.—A new line has been built by the Nicollet County Telephone Company extending into Lafayette township of Nicollet county and connects with the Lafayette exchange. The line just complete will be known as the Swan Lake line.

LE SUEUR CENTER, MINN.—Work will soon be commenced on the construction of the Cleveland telephone line.

PERHAM, MINN.—The telephone line has been completed to Dent.

REDWING, MINN.—Headquarters have been chosen for the new telephone company, of which D. M. Neil is the local manager. Arrangements have been about completed for the construction of the plant.

ANOKA, NEB.—The Farm & Home Telephone Company has completed its line into Anoka, and has established a toll office. The company expects to extend its lines to Baker some time in the near future.

HUMBOLDT, NEB.—The Humboldt Telephone Company is laying cables to accommodate rural patrons.

PLATTSMOUTH, NEB.—The Plattsmouth Telephone Company is extending its system at Greenwood.

TILTON, N. H.—The Citizens' Telephone Company is stringing new lines and putting in many new telephones at Northfield Center.

CHESTER, N. J.—The Chester Telephone Company is making arrangements to extend lines to Bartley, Flanders, Parker and Pottersville.

CHATHAM, N. Y.—The Chatham & Canaan Telephone Company is preparing to build additional lines in this vicinity.

HAMDEN, N. Y.—The Launt Hollow Telephone Company is extending a new line to Walton. It has been planned to extend the line in the spring from Walton to Rock Raft, where it will connect with the Cannonsville-Deposit line. The company at present has its headquarters in Hamden, but it is likely that the main office will be moved to Delhi in the spring. Ralph Anderson, of Hamden, is president of the company.

JOHNSBURG, N. Y.—Preparations are being made to extend the telephone system from this village to Luzerne. A long distance line will be installed and a local line with exchanges at Thurman and Stoney Creek.

MT. MORRIS, N. Y.—The Nunda Telephone Company is extending its line to this village.

ST. JOHNSVILLE, N. Y.—A long distance line from the East has been connected with the Interstate office in this city.

STAMFORD, N. Y.—A new telephone line is to be built between Jefferson and Stamford via Churchills.

WATERLOO, N. Y.—The Empire State Telephone & Telegraph Company is extending its lines in this village.

CHARLESTON, OHIO.—Frank L. Beam, general manager of the Columbus Citizens' Telephone Company, and Cyrus Huling, have been elected directors of the Home Telephone Company of Charleston. Their election is said to indicate a complete reorganization of the company, and an extension of its lines.

DUBLIN, OHIO.—The Citizens' Telephone Company is erecting a new building here, and will install a new switchboard.

ALTOONA, PA.—The United Telephone Company is constructing a line between Martinsburg and Roaring Springs.

BLOOMSBURG, PA.—W. W. Fagley, division manager of the United Telephone & Telegraph Company, with headquarters at Bloomsburg, is arranging for the construction of lines into Foundryville. A pay station will be installed for the present, but it is likely an exchange will be located at Foundryville in the near future.

CHESTER, PA.—The United Telephone Company is extending its aerial cable system in this city.

HOLLENBACK, PA.—The Hollenback Telephone Company will build a number of lines in the near future. M. W. Bittenbender is president and C. H. Harter, secretary and manager.

STROUDSBURG, PA.—The Stroudsburg & Bushkill Telephone Company has surveyed a route to Portland, and will extend its lines to that place, connecting there with the Slate Belt Company's system.

HUDSON, S. D.—The Hudson Telephone Company will extend a branch line across the State line into Iowa.

PIERRE, S. D.—Work has been commenced on the Cheyenne River reservation. Two lines are to be built, one from White Horse Camp and the other from Cherry Creek.

OGDEN, UTAH.—The Utah Independent Telephone Company is running an additional circuit between this town and Salt Lake City.

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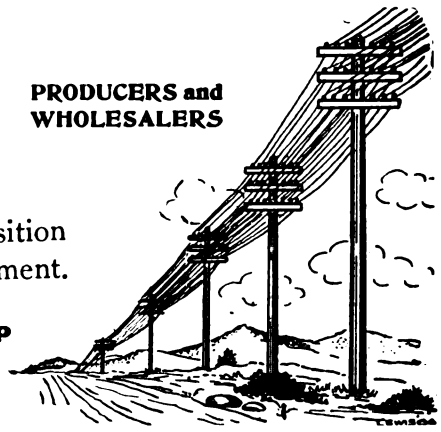

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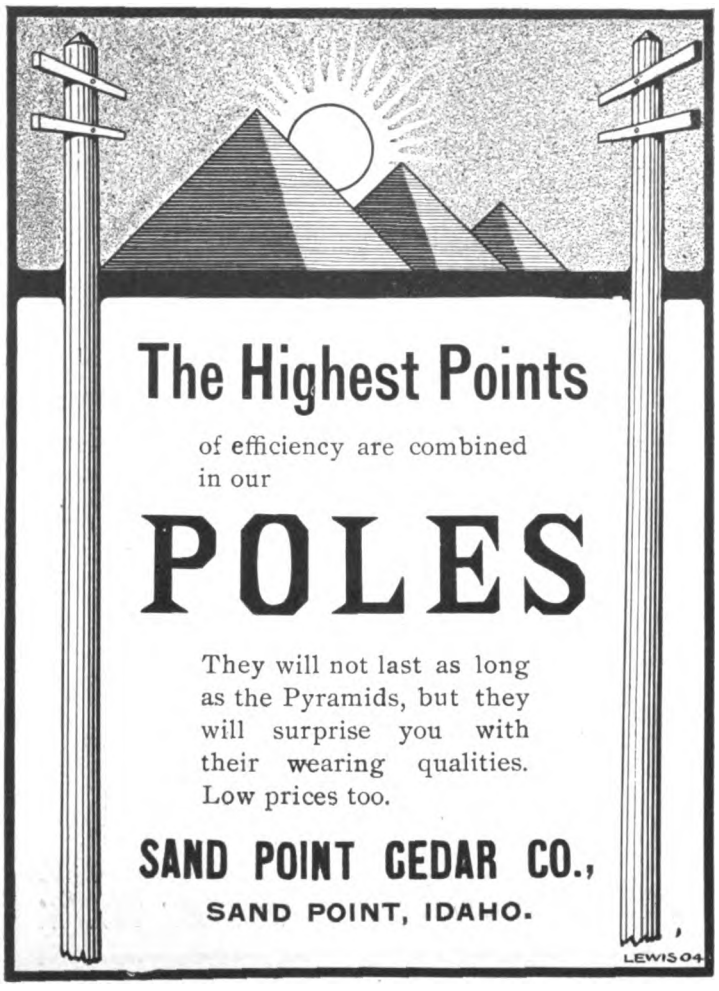

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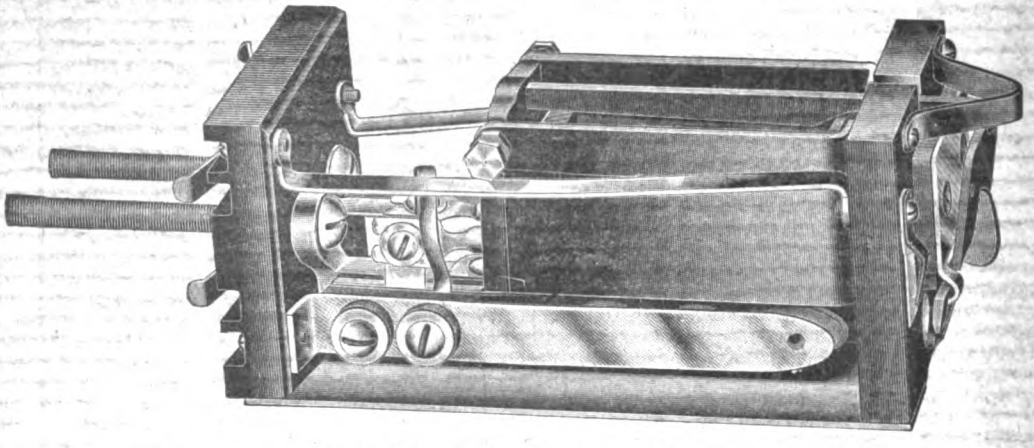

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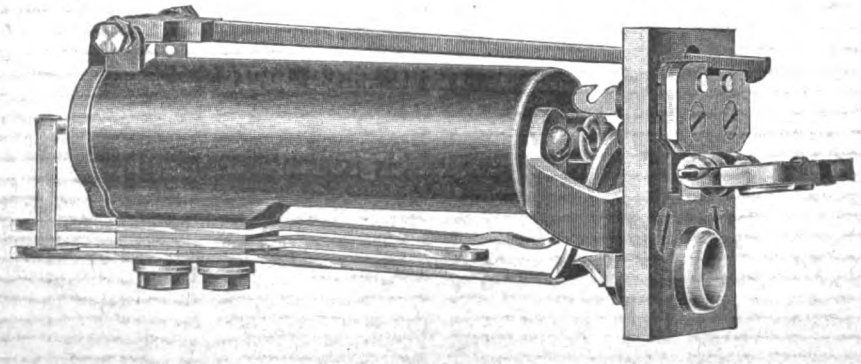

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is called to the editorial in this issue. The Editor has endeavored to present clearly the policy, past and present, of this paper—a policy always dictated by his clientele.

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The Editor gratefully acknowledges the many expressions of satisfaction with this department from subscribers, and would like to hear from every reader.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

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PUBLISHED WEEKLY ONE DOLLAR A YEAR

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IN THE MANUFACTURING FIELD
THE TELEPHONE IN THE COURTS
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WANT AND FOR SALE ADVERTISEMENTS, PAGE 29

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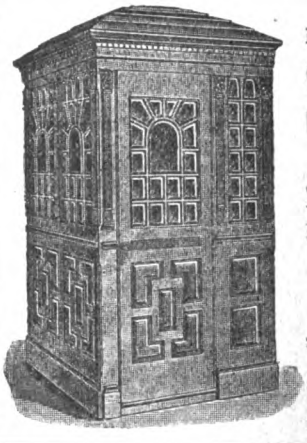

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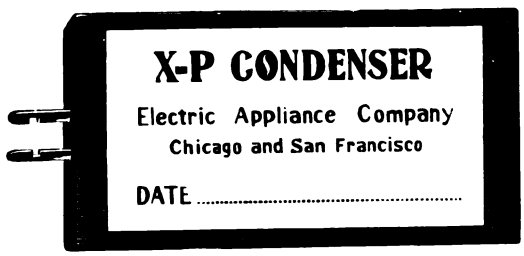

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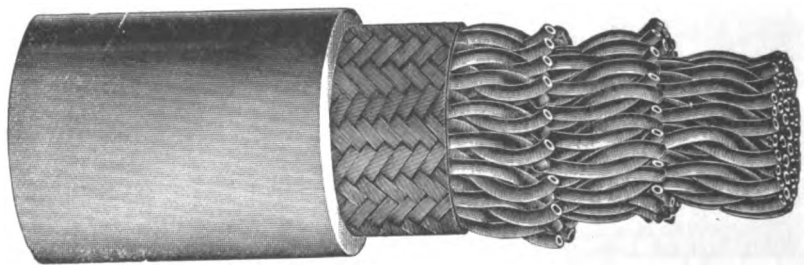

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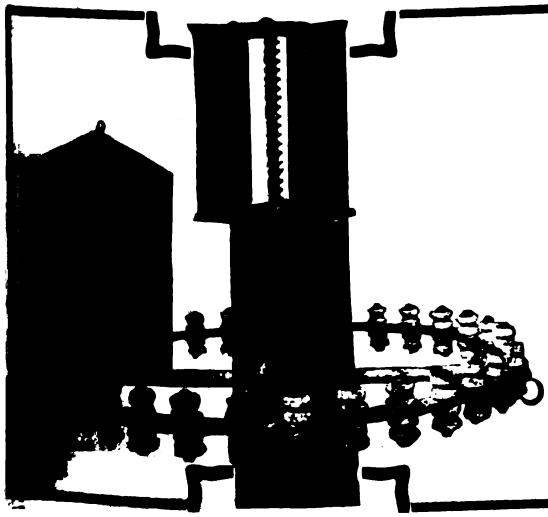

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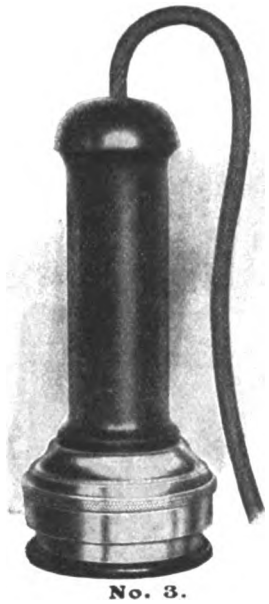

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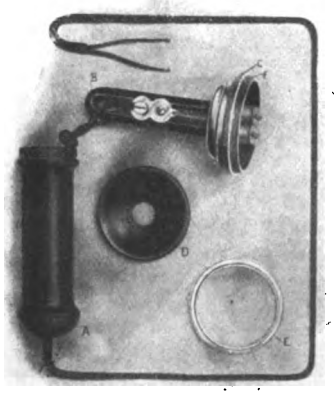

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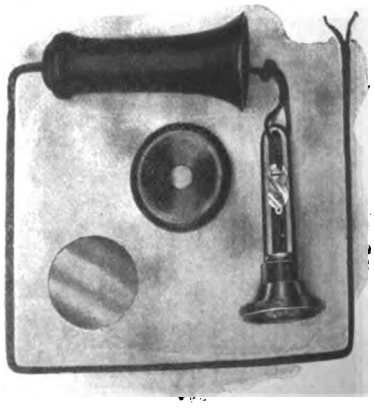

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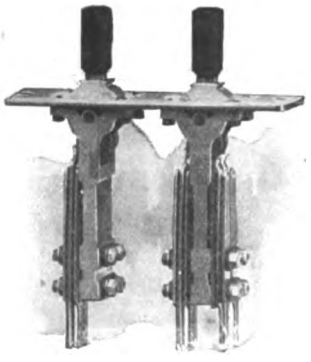

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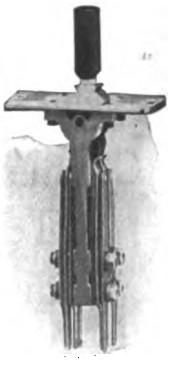

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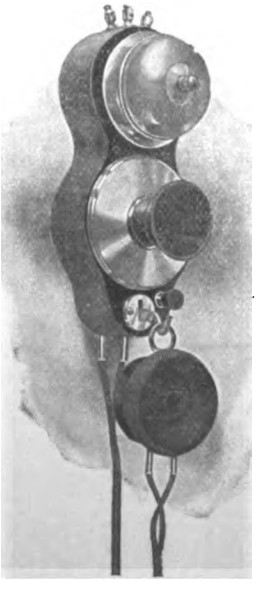

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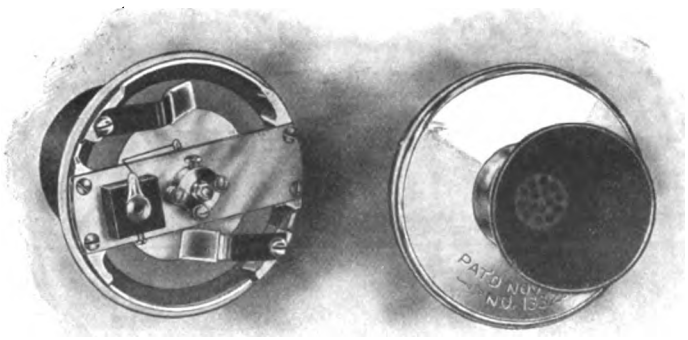

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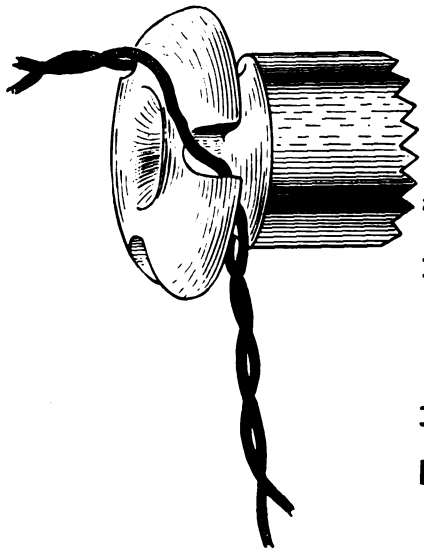

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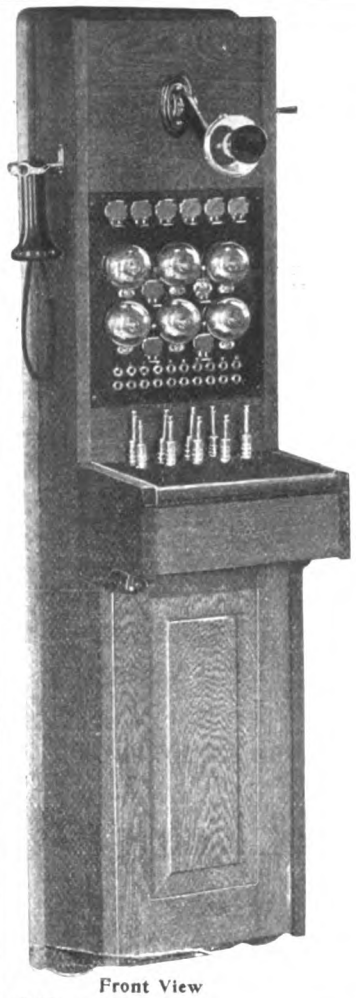

Front View

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DROPS

For INDIVIDUAL LINES

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For PARTY LINES

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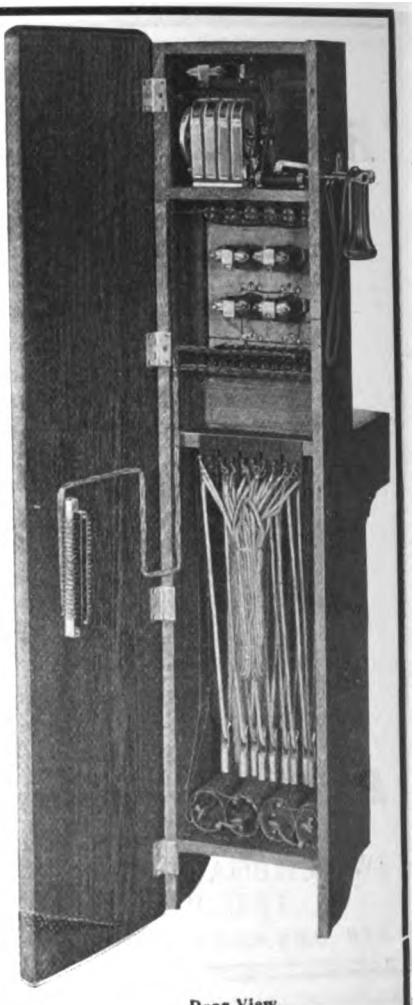

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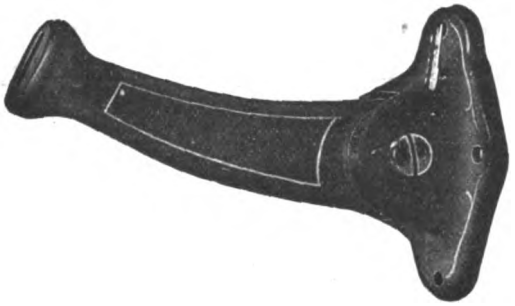

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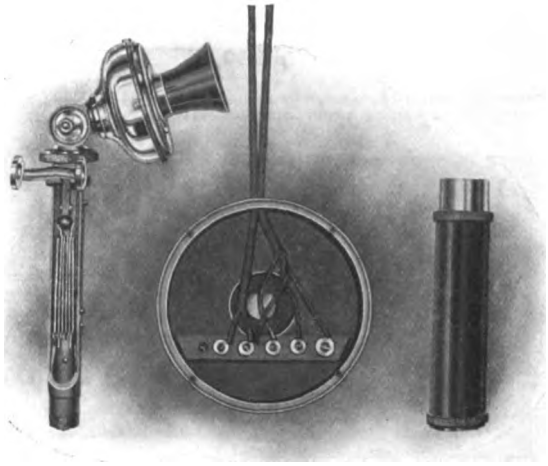

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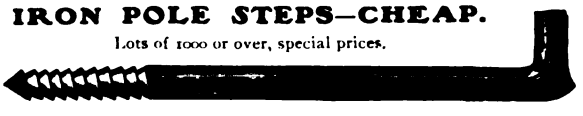

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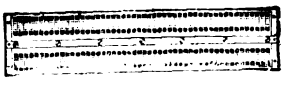

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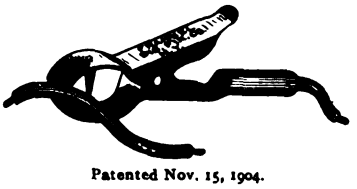
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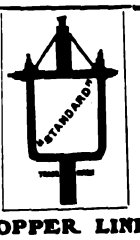

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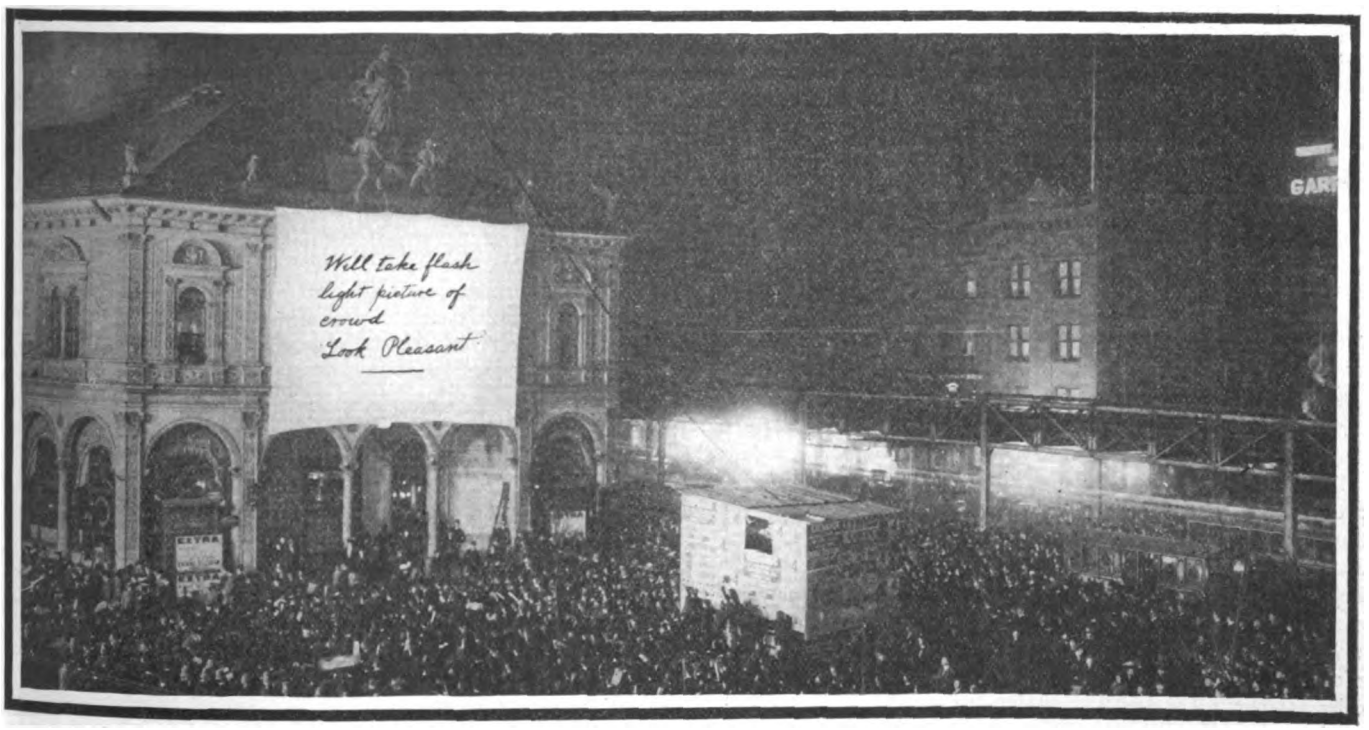
VOLUME 10 SATURDAY, NOVEMBER 19, 1904 NUMBER 21

THE PART PLAYED BY THE TELEPHONE IN THE RECENT ELECTION.

By Edward A. Tyler.

THE recent Presidential election added one more triumph to the record of the telephone. In all probability never before was this instrument so much used for a single purpose as in this campaign. North, South, East and West the telephone lines lent their aid, and if their services were not always successful in securing desired results, they were at least impartial and treated all alike. As a mechanical aid the telephone surpassed all its competitors, demonstrating its reliability in a way which proved beyond all question of doubt its superiority to other methods of communication.



Crowd in Front of New York Herald Reading Returns as Received by Telephone. (From a Flash Light Photograph.)

In many instances local campaigns were conducted by telephone and quite frequently long-distance messages were sent which materially aided the results of the election. President Roosevelt held daily conferences by telephone from Washington with the headquarters of the National Republican Committee in New York City. The Democratic nominee was in daily communication with his advisors, and in some of the Western States, notably Wisconsin, the candidates for various offices were almost continuously in touch with their constituents.

The crowning success of the telephone came when the returns were being distributed throughout the country. With but few exceptions, every company made special arrangements, so that their subscribers or the general public could know the results as soon as they were declared. In the larger cities, where there were both Bell and Independent companies, keen rivalry existed in distributing the news, each vieing with the other in giving the correct returns at the earliest possible moment.

In New York City, the New York telephone company had made elaborate preparations which involved the use of one entire floor of the John street exchange building and necessitated the services of 215 employees, besides 38 others distributed among the nineteen branch offices in the city and 58 at the twenty suburban exchanges.

The utmost care was exercised in arranging details, special instruction sheets being printed which outlined the work to be done and specifically assigned the men to their duties.

The general plan of the arrangements at the John street exchange can be gained from the accompanying diagram.

Through the center of the room three temporary tables were built, each having a dividing partition about eight inches high running its entire length. On this partition were mounted the bells and drops of the instruments. Two of the tables accommodated forty telephones, twenty on each side; the other, twenty, ten on each side. These one hundred telephons were divided into five sections, *A, B, C, D, E,* each in charge of a foreman and a relief foreman. To each section twenty-seven men were assigned,

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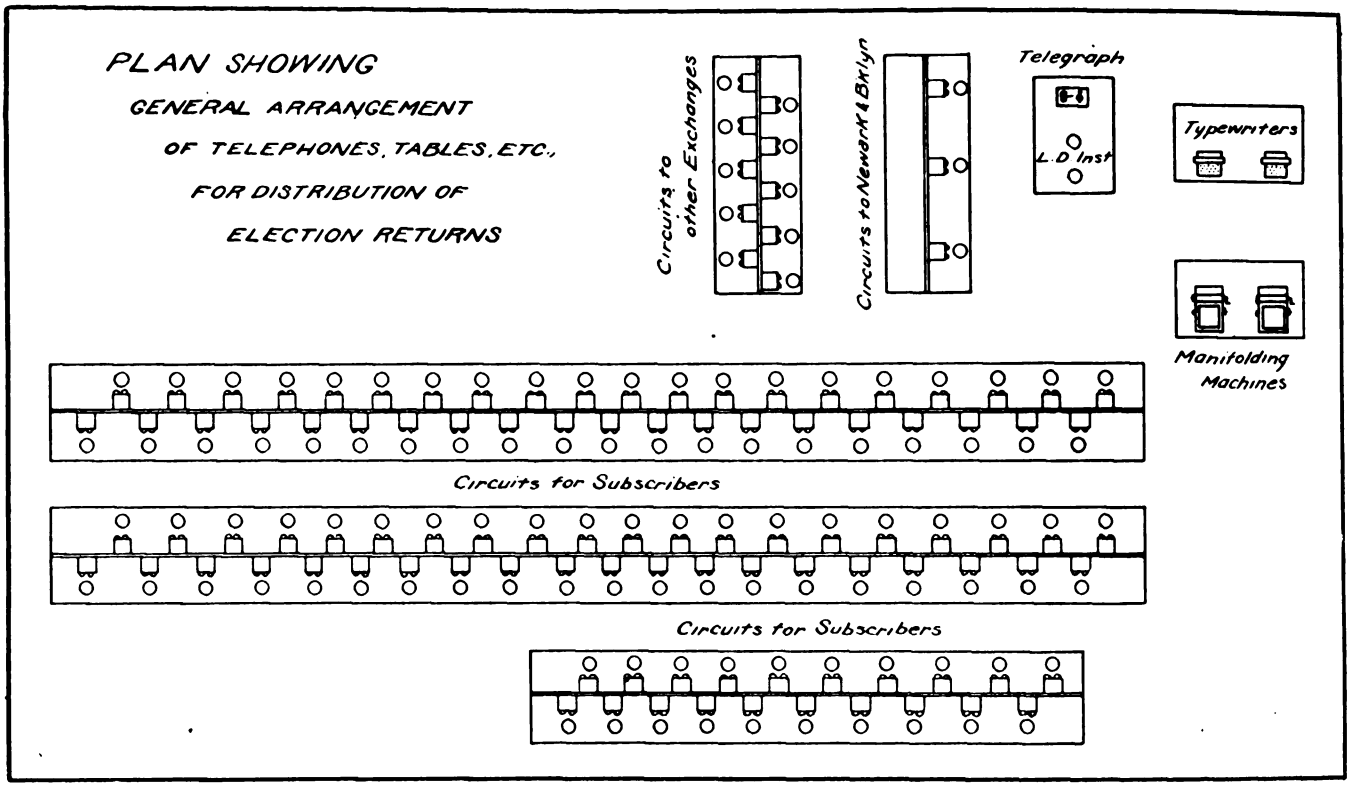

Arrangements Made to Receive and Distribute Election Returns by the New York Telephone Company at the John Street Exchange.

whose duties were to transmit the reports and to immediately clear any trouble that might occur. Besides the hundred lines there were special circuits to all of the branch exchanges, which terminated at another table. Twenty-five men were assigned to this in charge of a foreman.

The returns were received over two long-distance circuits and a reserve telegraph circuit. As soon as a report came in it was handed to a messenger, who gave it to one of a corps ot twelve men, whose duty it was to summarize, tabulate, edit and prepare the bulletins for the typewriters, of which there were two. As soon as they were printed they were turned over to the manifolders, which turned out twenty-four copies at a time. There were four machines employed on this work and a total of 15,000 bulletins were turned out.

These bulletins, as soon as they were printed, were distributed to the operators, who in turn repeated them to the subscribers. Four men were assigned to special duty at Police Headquarters to report any event of importance. The regular operating forces of all the exchanges were on duty, together with a large number of reliefs, in all about 1,000. As a rough estimate 10,000 calls were received for election news at John street and about four times that number at the other exchanges.

The special circuits were all wired into idle jacks in the main exchange, something like five hundred feet of cable being used. Trunk lines were connected to exchanges in Brooklyn and Newark, over which the news was distributed to points in Long Island and New Jersey. The special men detailed for the work reported at various times from 4 P. M. till 7 P. M. and remained on duty till about 2 A. M.

Aside from those to whom the telephone gave the news direct, all the daily newspapers employed special circuits in addition to their regular equipment and telegraphic service.

Election night in New York is a banner night in its history. Hundreds of thousands of people promenaded Broadway in the vicinity of the uptown offices of the papers, congregating in front of the bulletins in dense crowds. To enliven the intervals between reports moving pictures and stereopticon views were thrown on large canvas sheets. The crowd in front of the *Herald* building was probably the densest of any. This was mainly on account of its position at the intersection of Broadway and Sixth avenue.

In anticipation of the crowd that was expected, preparations were made to take a flash-light picture. A reproduction of the view is given herewith. In many respects this was a most remarkable photographic feat, as the results clearly indicate. Usually in taking a flash light the powder is fired off in one spot with but ordinary success. To be certain of getting the best possible results a wire was strung across Broadway from the *Herald* building to Macy's store. On this was hung four separate flash-light lamps about ten feet apart. Just before the powder was fired off the notice shown in the picture was thrown on the screen. At seven minutes past eight the powder was ignited, everything went off satisfactorily, and forty-five minutes later the picture was reproduced upon the screen. Two and a half pounds of powder were used to secure the result, and the success of the scheme is shown in the clearness of the photo, which could almost be taken for a daylight exposure.

In front of the City Hall another crowd which reached from Park Row to Broadway, a distance of about 100 yards, watched the bulletins of the N. Y. *Journal* and the *World*. Both these papers had special attractions in the way of lightning artists and moving pictures to entertain the people. The *World* arranged a series of signals in the shape of colored lamps, which surmounted the dome 300 feet above the ground, to indicate which candidates were successful. In various parts of the city fireworks were being continuously discharged. The part played by the telephone was not as spectacular, but its use alone made possible the other jollifications. Without the news there would have been no necessity for the special preparations, and even if they had been delayed till another time the delay would have robbed the display of most of its usefulness. Hence the telephone was the really successful candidate, being the people's choice for distributing the returns.

HAMILTON HOME COMPANY OPENS NEW OFFICE.

THE Hamilton, Ohio, Home Telephone Company has completed the installation of its new exchange at Reilley. This company has had a most prosperous year and has increased its number of subscribers considerably. Quite recently it purchased the West Butler County exchange at Scipio. This, with other extensions and improvements, has greatly benefited the company's service to the western part of the county.

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THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER

ARTICLE IV. CIRCUITS AND THEIR OPERATION.

By A. Dallam O'Brien.

PRIVATE branch exchanges may be designed to operate in connection with either a magneto or a common battery central office, in the former case the extension stations to the branch exchange being each equipped with separate transmitter batteries and operating as magneto instruments. The arrangement of the circuits and their design and operation in the case of a magneto system, is a comparatively simple matter, and will not be considered in detail in this article, as the use of the common battery exchange for this purpose is becoming more and more general, and furnishes a subject of greater interest. The first requisite for the line circuit which connects the branch exchange and its extension station is that battery should be furnished to the line in order that the branch may be signalled from the extension by the removal of the receiver from the hook.

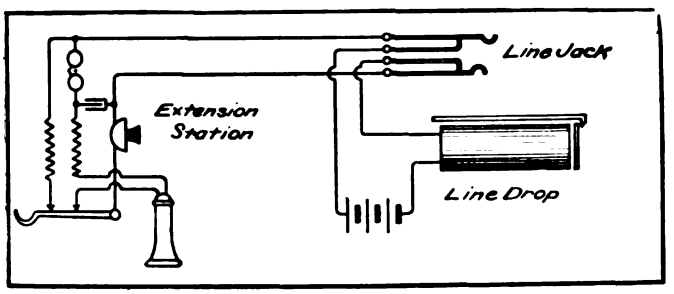

Fig. 1.

Probably the simplest method of accomplishing this result is shown in Fig. 1, and this circuit, with greater or less modifications, is the possible basis for the line circuit in use in all of the common battery private branch exchanges operating at the present time. By referring to the figure it will be seen that the jack at the switchboard, in which the extension line is terminated, is equipped with four contact points, the two inner contacts being arranged to be cut off from the circuit when a plug is inserted in the line jack. The line from the extension terminates at the long springs of the jack, while connected to the inner contacts is a drop or magnetic signal and a source of battery, as shown in the diagram.

From this description it will be apparent that the removal of the receiver from the hook at the extension station closes the circuit from the battery through the station and the line drop, and by energizing this drop signals the operator. In some types of switchboards for this purpose the drop is replaced by a relay which operates when the line circuit is closed, and by its operation closes a local circuit in which is included a small incandescent lamp, and in this way the branch exchange may readily be equipped as a lamp signal board. In either case the operation of answering at the switchboard cuts the signal equipment out of circuit and restores it to its normal condition except where a drop is employed, and in this case the shutter must be restored by hand. As the drop, or relay, is not connected across the line circuit when the line is busy, there is no path for the talking current through the signal circuit, and for this reason a low resistance drop or relay may be employed, the only necessary feature being that it should have sufficient ampere turns to enable it to operate with the current which is sent through it.

The trunk lines which connect the branch to the main exchange are of necessity somewhat differently wired at the branch end, as owing to the fact that battery is applied to the trunk line constantly at the central office end, it is necessary that precautions should be taken to prevent the continual flow through the trunk line signal at the branch exchange; for this reason a condenser is inserted in series with the trunk line drop, and this offers an effectual bar to the passage of the battery current from the central office. The presence of this condenser in the trunk circuit makes it necessary for the central office operator to ring over the trunk line when signalling the branch exchange, as the alternating ringing current will readily pass through the condenser and operate the drop. As in the case of the line drop, the trunk drop may be replaced by a relay which operates to close a local circuit, including a small incandescent lamp, and thus provides the board with lamp signal equipment throughout. The arrangement of the trunk circuit is shown in the diagram of Fig. 2.

The connecting cord circuit furnishes the most complicated arrangement incident to the exchange, as it is necessary to provide in the circuit for supervisory signals, by means of which the branch operator is kept constantly in touch with the condition of the connection. In Fig. 3 is illustrated a cord circuit arrangement employing a repeating coil and two supervisory signals, one in the answering and one in the calling cord. This arrangement will be readily recognized as being closely related to the cord circuit of the common battery central office switchboard. By referring to the diagram it will be seen that the battery is bridged between the four windings of the repeating coil, each of which has a resistance of approximately 40 ohms, the size of wire, and the number of turns in the windings varying with the systems of different manufacturers. In series with the positive side of each cord is inserted a magnetic signal arranged to display its target when the magnet is energized and to drop the target when the flow of current ceases. The calling cord is wired through the contacts of a ringing key, and the listening key is connected, as shown in the diagram. In some switchboards both the answering and calling plugs are equipped with ringing keys, so that the stations may be called by means of either cord, but when the back cord is used solely for answering, and the front cord for calling, two ringing keys are unnecessary.

Upon receipt of a call at the branch exchange the operator answers by placing the answering plug in the jack of the calling line. The telephone at the calling station being removed from the hook, current flows from the battery through the supervisory signal and extension line, through the instrument and back to the battery, thus operating the supervisory magnet and causing it to display its target. By throwing the listening key on the pair of cords in use, the operator is placed in connection with the substation and can obtain from the subscriber the necessary information regarding the connection desired. Should the station to be called, be one which is connected to the private branch exchange, the operator places the calling plug of the pair in use in the jack of the desired line, and rings. As in the previous case, the appearance of the supervisory target notifies the operator when the called party has answered. When the receivers are replaced upon the hooks the supervisory targets drop and the operator is notified of the completion of the connection. Should either substation desire to attract the attention of the operator during conversation, it is only necessary to operate the hook at the extension, this action causing a movement of the supervisory target, as will be readily seen from the diagram, and thus attracting the operator's attention.

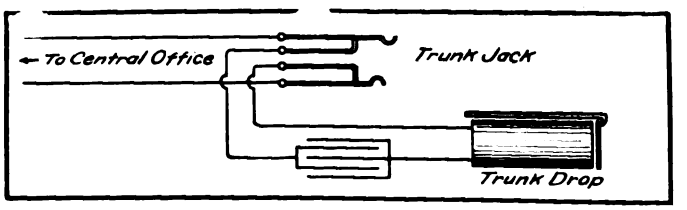

Fig. 2.

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Should the call from the extension station be for a line reached over a trunk from the central office, the branch operator signals the main exchange by placing a calling plug of a pair in the jack of a trunk line, it being unnecessary in this case for the operator to signal by the use of her ringing key, as the circuit from the central office is closed through the plug at the branch exchange, and the line relay at the main office operated. In signaling the central office it is advisable for the operator to use a plug belonging to a pair other than that to which the extension station is connected, although at times it may prove advisable to use the other plug of the same pair of cords and allow the person at the extension station to ask the central office operator for the number desired. On trunk line connections the supervisory signal in the cord which is connected to the trunk line will not fall when the operator at the central office disconnects from the line, and in such cases it is necessary for the branch exchange operator to supervise the connection entirely by means of the signal in the cord which is connected to the extension line.

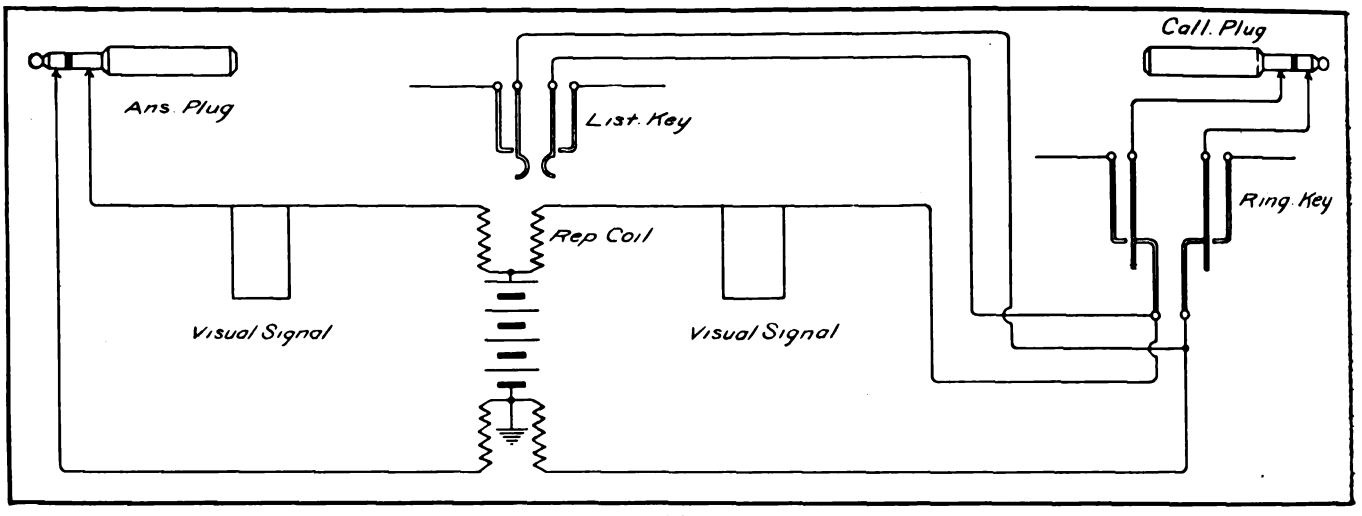

Fig. 3.

As in the case of the line circuit, the magnetic supervisory signal may be replaced by a relay which operates to close a local circuit in which is wired an incandescent lamp, and the supervisory signals thus be made lamp signals.

HINTS ON RURAL CONSTRUCTION

ARTICLE I.—LAYING OUT ROUTE.

By P. A. Price.

ONE of the first considerations in the building of a telephone system is the routing of the pole lines. Vital as the Central Office equipment may be, the reaching of subscribers, actual and prospective, is equally important, and an intelligent review of the territory to be covered will result in much economy of labor and material. In every community there are sections of territory that will sooner or later yield results to soliciting, and as careful provision should be made for their wants as in the established business and residence districts. Throughout the surrounding country there are farms and country places which need telephonic communication with the town. No haphazard, helter-skelter arrangement of lines will do; the routes and territory must be gone over systematically; so, first of all, map out the territory which it is proposed to include in the system, bearing in mind that just as much as the village or town is the commercial center of a certain area, so must the telephone system occupy a similar position. In every community a map of the surrounding territory can be procured, and from this ascertain the area of territory to be covered; then by means of soliciting, going over the ground in a thorough canvas, a general idea of the amount of prospective business can be discovered. Advertise. Get people talking telephone, and when you have the names and addresses of enough to justify going ahead with the work, mark their locations on the map. It will soon be seen that in some parts of the community there are a great many subscribers, while in others they are scarce and scattered. For this reason it is absolutely essential that the territory is thoroughly investigated. Now you are prepared to lay out the routes.

The location of the Central Office should be a happy medium between the business and the residence districts, but in a village where the local area to be covered is small the business section is usually selected for the seat of operations. It also frequently happens that the main street of the village is the principal outlet to the surrounding countryside, so if that be the case, it is well to arrange to take care of the country lines on the route as well as the short local lines. If the business section centers on the main street and is comprised within several blocks on either side of the thoroughfare, cable distribution would obviously be the best to chose. While its initial cost would be more than open wire, if there is any number of subscribers at all in the area, say twenty-five to fifty, cable would in the end be cheaper.

As to the route through the business section, the franchise gives the right to erect poles, maintain wires, etc., but these rights are not to conflict with those of property owners and others who might be inconvenienced, damaged, or injured by the poles, wires, etc. If it is decided to use cable construction, the poles should be set closer together than is necessary for open wire. For a well built cable lead, they should not be over one hundred and ten feet apart; for open wire they should average about forty to the mile, about one hundred and thirty-two feet apart. This, of course, depends a great deal on the weight or amount of wire they are intended to carry, but it is a safe figure for an ordinary line.

The distance determined on should be measured off with a line, and the location of the poles marked by a stake, or other positive method. If there are any electric light circuits on the same street, get on the other side of the road if possible. Keep away from light leads wherever you can. Having marked off the line through the business center, see if there is any objection to the locating of the poles as you have marked them off, and use all peaceful means to preserve the locations. A properly spaced pole line is a great factor in its life, as the strain of the wires and cables falls evenly upon it and does away with much guying.

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The route through the business section being laid out, look up the map and see if the residence district can be made tributary to it, or if it can be extended to take in this part of the village. Perhaps it can, but the streets are lined with trees. Now, there is only one way to go up a street lined with trees, and that is by cable, with frequent distributing boxes. It is, of course, feasible to go up the back way, through a convenient alley, or on a private right of way, 'cross lots, back yards, etc., but if there are residences on both sides of the street, this would necessitate two separate routes, in the back yards or alleys of both sides.

Attempting to run an open wire lead through a row of trees lining a street is folly. To go over their tops with high poles is but putting trouble off for the future, for trees grow, and poles

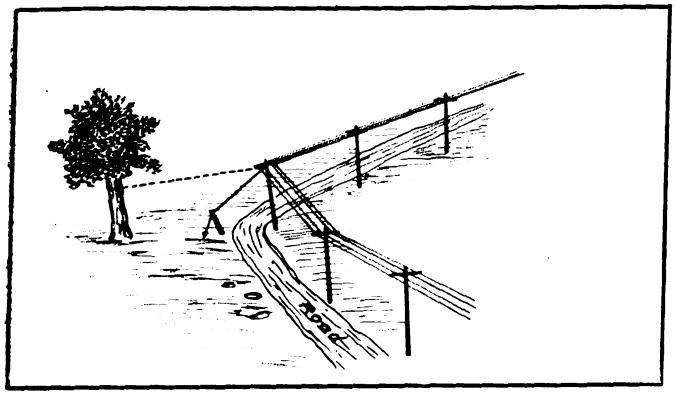

Fig. 1.

don't, and the expense of a high pole line, high enough to be clear for years to come, is well-nigh prohibitive for a small company to undertake. So if there are trees in any abundance along the right of way, use cable, and don't hang it too high in the air, either. You will find that the property owners will allow you to suspend the cable on the trees in preference to allowing them to be trimmed. The object in hanging it low in the trees is to keep it from swaying limbs and branches, which will injure the sheathing.

We have been discussing the case wherein the residence section is built up along the same street as the business locality. But it may set away from the main street. In this case, another route must be taken from the Central Office, and it may be practical to use open wire for a part of the way. But all the circuits enter the Central Office through cable, and if cable will have to be used in any quantity at all along the line, it would be best to make it all cable. Don't come out of an exchange with cable, run open wire for a way, and then go into cable again. It is poor policy. If it is possible to distribute to the subscribers with open wire all the way from the office pole, or carry the office cable to a distributing point and then go on with open wire, the use of cable is an unnecessary expense, unless the open wire lead will be of any great size, but for a lead on which cable will be used at all for the distribution of the wires, it is best to make cable all the way.

Open wires attract lightning, while cables, if properly grounded, will not be bothered except from that caught by the subscribers' loops, and if they are equipped with proper arresters the cable will suffer no injury. Try and make it a point to have the subscribers' lines leave the cable for good, when they do leave it, and not to go into cable again on the route.

From the two routes laid out, one through the business section, and another through the residence locality, it ought to be possible to reach all parts of the village, if of ordinary size. If there are a group of places, say warehouses and mills, apart from both residence and main business section, a convenient method would be to build the line from some point on either route as near to Central Office as possible. The reason for this is to divide the routes as much as possible without actually building separate ones, and will be explained later. Make all routes as direct to their distributing points as possible. Let the route through the business section carry the lead for the residence district if that is the more direct. Cable costs money, so does open wire, and poles will carry both. But that doesn't mean to carry either cable or wire in a roundabout way. The more compact the pole system the better, but get to the distributing point with the wire or cable in the most direct way.

Having thoroughly canvassed the village proper, if it is intended to include the country territory in the system, the extent of possible business should be ascertained at once. Many of the country lines will enter the village through either the business or residence section, and it is well to know what provision should be made for them on the open wire and cable leads.

Around every village of any size are hamlets, or small communities, which wish to be in touch with the larger town and with each other. Some of them may have telephone service from some other system with which it is proposed to make connection. Again, a small community may yield poor results in the way of residence service and still be profitable to a pay station. Sometimes a group of eight or ten or more subscribers for party line service can all be put on one circuit, so that they will be able to call each other and the Central Office as well.

In building farmer lines, some companies adopt the following plan with good results: The telephone company builds its lines along the main roads of the district likely to yield, or guaranteed to yield, the greatest number of subscribers. Then all subscribers living back from the main line are required to furnish poles, right of way, and labor necessary to reach the company's lead. The wire, brackets, arms and insulators are furnished by the company, with the skilled labor necessary to string the wire, install the instrument, etc. Sometimes a group of farmers are living near each other in a little "neck-of-the-woods" about a mile from the main line and want telephone service. The company would hardly be justified in building this line on the low rental received for service, and in this case the plan outlined above would be entirely satisfactory. The farmers could build the pole line at their leisure—the route being staked out by the company's superintendent—and the linemen would string the wire. In a mile of line the bill for labor—digging holes, setting poles, etc., would be considerable. In the majority of cases the farmers will agree to do this if it be firmly stated that it is imperative if they want telephone service.

Having determined which country roads will yield best results, and how many subscribers must be provided for, map out the district the same as the village has been gone over. Now everything is ready to estimate the amount of material required. Unless the distance to be covered is known, the following plan will be found serviceable: Take the diameter of a front wheel of

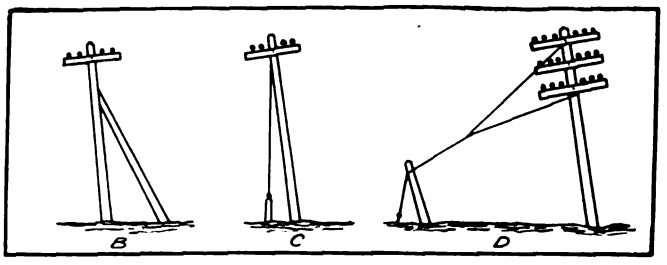

Fig. 2.

a buggy and multiply it by three and one-seventh; this will give the circumference or the number of feet gone over by one complete turn of the wheel. Forty poles to the mile has been suggested as a good spacing for pole lines. This means the poles are to be one hundred and thirty-two feet apart. See how many revolutions the carriage wheel must make to cover this distance, by dividing 132 by the circumference of the wheel. For convenience you can drop the fraction, as the pole line will be straighter than the route taken by the carriage. Say it comes out that the wheel makes fourteen revolutions in going the distance. Tie a rag or paper on a spoke of the wheel and count as you go along; every fourteenth revolution measures a pole space and should be noted down.

This will give a fairly accurate idea of the number of poles

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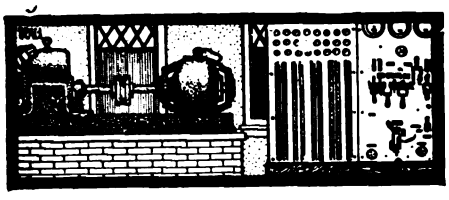
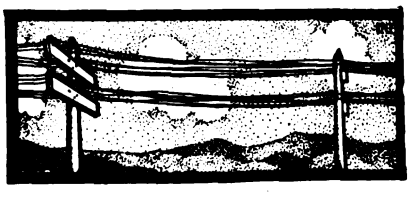
required, but other notes should be made as well. For instance, wherever the pole line turns a corner it should be guyed, that is, braced to stand the strain of the wires pulling around the corner. This guy should pull the pole in the opposite direction from which the wires are pulling, and on a sharp turn sometimes two guys can be used advantageously. A glance at the diagram will make the idea clear. Fig. 1 illustrates a case where there is no chance of guying directly to the ground, as the pole is too close to the road, so the guy wire must be taken to the other side. It may be that there is a convenient tree to which it can be attached, as shown by the dotted line. If there is no tree, either a "push guy" (*B*), Fig. 2, or a shorter pole must be placed across the road and the guy made fast to the top of it, in order to keep it clear of teams and high wagons. The "push guy," *B*, is a pole so set as to lean towards and against the pole carrying wires, and firmly fastened to it near its top, and serves to push the pole away from the direction of the strain of the wires. They are unsightly, and mar the appearance of a line, but are very satisfactory in serving their end. *C* shows how a pole may be guyed from a point near its butt, by means of an anchor, and *D* shows a "Y" guy for heavy leads. These will be explained in a later article.



QUERIES

Questions on any subject relating to telephony will be answered on this page.



PUSH AND PULL BRACE.—(453.)

We have heard of push and pull braces for pole lines. What are they and where used? G. N.

A push and pull brace is illustrated in Fig. 453a. It is used to brace a pole which may be set in soft ground, and as its name indicates it is intended to prevent the pole moving in either direction. Its method of application is shown in the diagram, attention being drawn to the cross piece *C*, which consists of a log about four or five feet long bolted to the brace *D* at *B*. The pole itself is bolted to the brace at *A*. A good way to secure a solid hold for the brace is to cover the log with stones, which will act as an effective ballast.

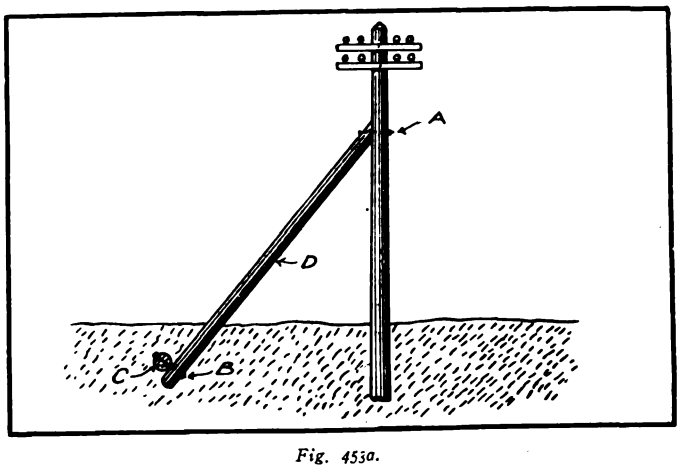


Fig. 453a.

Where the ground is very soft or marshy a method of bracing, which is illustrated in Fig. 453b is often used. In this case to the bases of the braces cross boards are securely fastened, as shown at *B*. A good width for these boards is 18 inches and about 2½ feet long.

When placed in position a similar method of ballasting should be used.

This method of protection for a pole line, although not as pretty as when guy wires are used, serves its purpose very well and at the same time insures the stability of a pole under almost any conditions.

RURAL LINES.—(454.)

We are building some country lines and expect to have a number of subscribers on each one. Would it be better to use metallic circuit and place all the telephones on one route on one line or to use grounded circuits and split them up. In the latter way we would not require so many different signals. Has it any other advantage? K. L. T.

It is our opinion that metallic circuits are the only ones which should be employed. Grounded lines are often noisy, and it is impossible to rid them of cross talk, especially if they are long. Selective signaling can be as well accomplished over a metallic line as on a grounded one by dividing the bells and connecting one set between one side of the line and ground, and the other set between the other line and ground and using a ringing key which will bridge the generator between either side of the line and ground.

If the lines are to be heavily loaded, it would be a good plan to build additional lines to take care of the subscribers nearer the exchange. The cost at the present time would be much less than later on, since you have the construction men right on the spot and it will take but little longer to put on pins and insulators and run the additional wires, which can be done at the same time the ones you intend to install are put up.

TRUNK LINES.—(455.)

We have two toll lines going to the same exchanges, *A* and *B*. We are going to open a new office at *C*, which is about 10 miles further out than *B*. Would it be better to run a trunk from *A* to *C* or could we use one going to *B* with cut in Jacks at that station. J. S. T.

The necessity for the new trunk from *A* to *C* is determined entirely by the amount of business done over the two trunks between *A* and *B*. If they are worked to their full capacity, then it is imperative to run a new trunk to *C* direct. If, however, one trunk from *A* to *B* could be spared for the joint services of *A*, *B* and *C*, then there is no necessity to run a new line, except that if business is expected to grow between *A* and *C* or *B* and *C* to the extent of utilizing the joint trunk exclusively for business between *A* and *C* and *B* and *C*, then the best policy would be to construct two trunks, one from *A* to *C* and one from *B* to *C*.

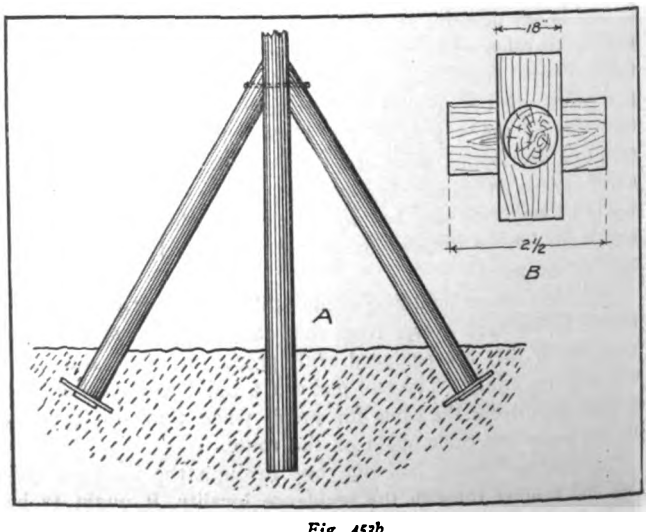


Fig. 453b.

For testing purposes the trunk from *A* to *C* should be cut in to the main frame at *B*, and be protected both ways with protective devices.

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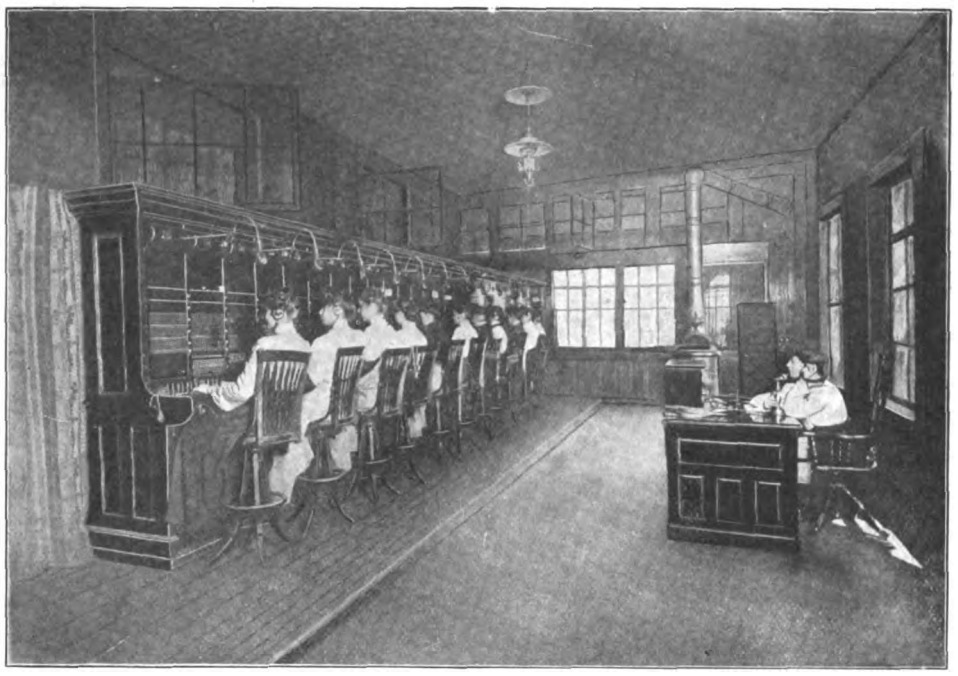
THE EXPERIENCE OF THE HOME TELEPHONE COMPANY IN SPRINGFIELD, MO.

TELEPHONE development in Missouri has been rapid and at the same time the companies which have dared to oppose the "Majesty" (?) of the Missouri and Kansas Telephone (Bell) Company have not had any cause to regret their advent into the field. Probably one of the best illustrations of the possibilities of up-to-date fearless management is offered in the success which has attended the Home Telephone Company of Springfield.

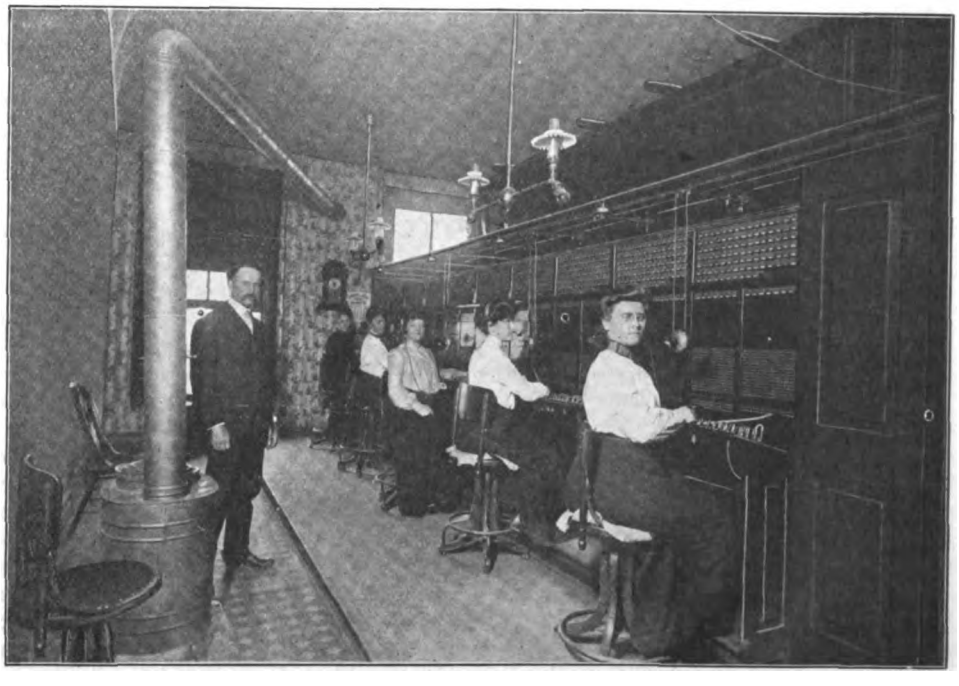


Office of the Home Co., of Springfield, Mo. Twenty Months in Operation.

Previous to this company's incorporation three others had attempted to start an exchange and went so far as to secure hundreds of subscribers, but unfortunately the intimidating action of the Bell with free rates and free telephones worked the desired effect, and the companies withdrew. The gentlemen who organized the Home company were made of sterner material, and notwithstanding the same tactics being applied to them as fell to the lot of their predecessors, they went ahead with the work of securing subscribers, and have to-day 1,900, although not more than 1,000 were expected. At the present time new telephones are being installed at the rate of 40 to 60 a month, and the switchboard capacity has recently been increased to take care of 2,500 subscribers..

The line plant is almost entirely cable, both aerial and underground systems being installed. For distribution purposes 146 outlets, or terminals, alone being used for connections to the aerial cables. The rates are $30 for business telephones, $20 for private line residence, and $12 for four party line residence; for the latter service the American Electric Selective system is used. Since the first of the year nearly 500 new subscribers have been secured, and when the long-distance lines which are being planned to reach Kansas City and St. Louis are completed it is more than probable that the number of subscribers will be greatly increased, if not doubled.

Perhaps the situation can be better understood by reference to the pictures, which need no explanation. These were secured to illustrate an advertising folder entitled "By the Will of the People," which created a great furore in the camp of the enemy, and dire results were prophesied. Not the least of these was that after its system was rebuilt, which was done this summer, they, the Bell, would replace every telephone of the Home Company with one of theirs. The most reckless inducements were made. Business houses were given one free house telephone with a rate of 50 cents per month for additional instruments, and in some cases contracts were dated six months ahead for private line service. Still the Home Company flourishes, which is a very good demonstration that the Will of the People is on the side of the Independent company.



Office of the Bell Co. in Springfield, Mo. Twenty Years in Operation.

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THE ADVERTISER AND THE OPERATOR.

SINCE the inauguration of our new department, "In the Manufacturing Field," we have received hundreds of letters commending us for this matter. And, without exception, our subscribers are agreed that here they will find reading that will be as interesting to them as any other part of the paper. Some even go so far as to say that it will be "the most interesting part" of the paper. We are fully agreed with these correspondents, and it is our hope that we may be able to impress on all of our readers the fact that a careful perusal of this new department will repay them a hundred fold for the time expended. In a single line they may find material that will effect for them a saving of hundreds of dollars.

There is only one department that should be studied with greater attention, and that is the advertising section itself. We doubt if all our readers appreciate fully the advantages that are offered to them each week by our advertising matter. Unless a man is an instinctive reader of advertisements, as all men should be, it requires some little education to bring home to him the important bearing that a close study of the advertising section of a technical publication has on his prosperity.

When a concern has sufficient faith in its wares to pay good money for their exploitation in a trade publication, it may very well be believed that they can offer something worth while the attention of every live man in the trade. In a publication of general circulation, such as newspapers and magazines, a concern may be willing to risk its money in advertising an inferior article, for here it has to do with a class of people among whom there can be few experts who know the true value of the wares offered. But with a technical or trade paper all the readers are experts, and the advertiser knows better than any one else that he must be prepared to have his offer analyzed and judged by men who are as well posted as to values as the advertiser is himself.

Under such conditions no one will be fool enough to offer goods that are not fully up to the claims set forth. Therefore the continued advertising of any article or any firm in a trade paper is in itself absolute proof of the integrity and standing of the advertiser, and the reader who does not carefully examine the advertising announcements in his favorite trade publication lacks business intelligence.

The question was summed up admirably by Charles F. Speed, of the Washtenaw Home Telephone Company, Ann Arbor, Mich., who in a paper read before the Michigan Association convention, made this statement:

> "I save my salary and more every month, by answering advertisements and learning where to buy. Advertise what you have to offer and read the advertisements of what others have."

This statement ought to be borne home to every telephone operator in the land. It ought to be framed and hung up over the desk of every telephone manager, for what is true in Mr. Speed's case is true in the case of every other man engaged in the telephone business. Such a man, if he will only read the advertisements in his papers carefully, can certainly save his salary and more every month, and in addition acquire a store of mighty valuable knowledge.

It is because we are so fully impressed with the importance of our advertising section that we have recently made a departure in the arrangement of THE AMERICAN TELEPHONE JOURNAL, interleaving in the back part of the paper text pages with advertising pages. As a general thing, we are happy to say the new arrangement has met with endorsement as distinctive as the inauguration of the manufacturing news department. But we have also received a number of letters finding fault with us for inaugurating this new departure. One man writes:

> "I do not like the reading matter broken into by advertisements. I wish you would return to your old system."

Another, an engineer in a big manufacturing concern and a man who ought to have a broader view, has this to say:

> "I want to have my Journals bound when the volume is complete, but I don't care to have a mess of advertisements mixed in with the reading matter. Change back to the old style by all means at once.

It is to those of our readers who view the matter in this light and who are, we hope, very few, that this editorial is especially addressed. We ask that they will take it to heart. The "mess of advertisements" to which our correspondent noted above refers to so contemptuously, constitutes the backbone of the telephone literature of to-day. Without the "mess of advertisements" it would be absolutely impossible to publish THE AMERICAN TELEPHONE JOURNAL. It is the advertisers who are supporting this paper, and not the subscribers. The sale of THE AMERICAN TELEPHONE JOURNAL at $1 a year involves a loss to the publishers. This loss is met and overcome by the revenue derived from our advertising columns. Naturally, therefore, it is to the interest of our subscribers, as much as it is to our own, to see that value is returned to our advertisers for their investment with us.

We have had thousands of letters praising this paper for the course it has pursued, for the fine character of its contents, for its value as an instructor, as an upbuilder of the industry and a defender of the Independent industry against Bell aggression. And almost without exception these subscribers have marvelled at our ability to give so much for so little.

The answer to this marvel, as we have stated, is to be found in our advertising columns. Our subscribers can discharge their obligations in this matter by following the matter in these advertising columns, and placing their trade whenever possible with the houses that are there represented. By doing this they will insure the continued prosperity and continued betterment of their publication. By not doing it they lose an opportunity to strengthen the industry and strengthen the reading matter that comes to their desk every week.

It may be objected that the recognition of the manufacturer's claims as the chief support of a trade paper, if allowed, would militate against an independent and dignified course on the paper's part; in other words, that the manufacturer, being the chief source of financial revenue, would dominate the editorial policy to the detriment of the interests of the subscriber. The answer to any such objection is very simple. It lies in this: No publication that does not cater primarily to the interests of the people who are on its subscription list has any value as an advertising medium. Therefore, aside from questions of sentiment or policy, no editor who understands his business can afford to allow even the most liberal advertiser to influence the matter that appears in the text section. We believe it does not require any special testimony to make clear the fact that the editor of THE AMERICAN TELEPHONE JOURNAL has always lived up to this conception of the duties of the paper towards its subscribers.

SOME FACTS RESPECTING THE JOURNAL.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CONNECTIONS BETWEEN COMPANIES.

Some time ago, we secured a contract in competition with the Bell Company for the installation of a private exchange of about 225 telephones in a large hotel in this city, and as usual during the preliminary skirmishing, the Bell Company made a great deal of capital of the fact of their having extensive long distance connections and claimed that the exchange would be of little use to the hotel patrons without their long distance service. We got around that point by agreeing in our contract to furnish space in our board for a Bell long distance connection and agreeing to give the Bell Company all of the long distance tolls which might originate at any of the telephones in the hotel. We have the exchange installed and in working order and the Bell is now trying to crawl out of the long distance part of it on the grounds that they never, under any circumstances, connect with private exchanges using apparatus other than that furnished by the Bell Company. Can we not force the Bell Company to make this connection?

S. Tel. Co.

I DO not believe that the Bell Telephone Company can be compelled to connect with a rival company in the manner desired. The obligation that a telephone company is under as a common carrier is to furnish telephones to all people who wish to become subscribers in compliance with its reasonable regulations, but in the absence of a special legislation this has never been held to extend to connecting with the switchboard of a rival telephone company, and I doubt very much whether the courts would be willing to so extend it. At common law one carrier could not demand as a right that it be permitted to use its rival carrier's property for the benefit of its own business.

Two cases of somewhat this kind came up under "the transportation corporations law" of New York, which provides in section 103 that "Every such corporation shall receive dispatches from and for their telephone lines or corporations and on payment of the usual charges by individuals for transmitting dispatches." . . . It is held that this statute does not require one telephone company to supply connections with another telephone company so that the latter may use the connection established as part of its own and transmit thereover its own messages on payment of the merely nominal sum required by ordinary subscribers.

Bell vs. Hudson River Telephone Company, 19 Abb. N. C. 466, to the same effect is a more recent case. In re Baldwinsville Telephone Company, 53 N. Y. S. 574. People vs. Central New York Telephone Company, 58 N. Y. S. 221. In this latter case common law rule is laid down as I have stated it above.

The one case compelling connection between telephone companies was that of Campbellsville Company vs. Lebanon L. & L. Telephone Company, 88 S. W. 1114. This was a case that arose in Kentucky and was decided last May. The relator was the successful party. The case was decided under a section of the constitution of the State, which declared that telephone companies or exchanges in different towns or cities should receive and transmit each other's messages without unreasonable delay and discrimination. The two companies also had a contract for the exchange of service which rendered the case still different from the one we are considering. I think that in the absence of a constitutional or statutory provision that you have no relief.

HIGH AND LOW TENSION CURRENTS.

THE Des Moines Edison Light Company is in the courts asking a temporary injunction restraining the Mutual Telephone Company from erecting and maintaining a line of poles and wires along a certain alley in the city of Des Moines, Ia. The petition is based on city ordinances which say that where two lines of electric wires occupy the same street or thoroughfare, one line carrying a high and dangerous current, and the other a weak current, they shall be erected on opposite sides of the street. The Edison Company alleges that it has, and for some time has had, its lines established on the north side of the alley in question, some of its wires carrying currents of from 230 to 2,300 volts, while the arc light wires carry currents of 4,000 volts, a current highly dangerous to life.

It is claimed that on July 28 the Mutual Telephone Company erected a line of low current wires on the same side of the same alley; that its poles were about the same height as the poles of the light company and mingled the wires of the two companies. It is said that there have been several contacts established, which, in case of rain, would ground the wires of the light company with danger of burning out the same and killing anyone who might come in contact with the poles while they were carrying the high currents.

ALDERMEN CITED FOR CONTEMPT.

THE mayor and members of the common council of Red Lodge, Mont., have been cited to appear and show cause why they should not be punished for contempt of court for disobeying an order of the court by refusing the Rock Mountain Bell Company the right to construct its lines in the city of Red Lodge. The trouble between the city and the company began more than two years ago, when the company attempted to build their toll and exchange lines within the city. At that time the linemen and superintendent of the company were arrested for violating a city ordinance which had been recently passed for the purpose of stopping the company from building the lines. Heavy fines were imposed on the employees of the company by the police magistrate. The company took an appeal to the district court on the ground that the fines were excessive, and won its appeal. However, an injunction, secured to compel the company not to interfere with the construction of lines, was dissolved, it being held by the court that the city had the right to determine whether the telephone company might do business within the city. A reversal of this decision was secured in the supreme court. It is now claimed that the city is retarding the building of lines and denying the company rights given them in the supreme court decision.

RECORDING OF FRANCHISES.

THE Central Maine Telephone Company and the Somerset Farmers' Co-operative Telephone Company at Skowhegan, Me., are in difficulties over an attempt by both companies to enter the town. The Central company alleges that the Farmers' company has not recorded its permit, and so is debarred from entering. Under the statute governing the procedure on petitions of this nature, the permit, if obtained, must be recorded within one week after it is granted, to allow of appeal to the Board of County Commissioners. The selectmen of the town, in granting permits to the two companies, made the recording of these instruments a prerequisite to their validity and provided that the permits should not be deemed accepted until recorded by the companies. Both permits were granted on August 27. That of the Central Maine Company was recorded on that day, but that of the Farmers' Company has not yet been recorded. The Central Company claims that this failure to record the permit within the statutory period renders the proceedings void as a whole, and it will take measures to prevent its rival from entering the town if it tries to do so.

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IN THE OPERATING FIELD.

NEW TRAFFIC RULE OF ROCHESTER HOME COMPANY.

THE Rochester (N. Y.) Home Telephone Company, anxious to give its patrons the best possible service, recently sent to each of its subscribers a circular asking that they indicate on a postal card enclosed their desire as to the continuance or discontinuance of the practice of calling back for connections with lines that were busy when first called.

Out of 2,036 replies received, 1,025 were for the system, 973 against, and 38 were indifferent. The company has therefore resolved to adopt the following system: "When a line that is called for is busy, the operator will say, 'The line is busy.' The calling subscriber desiring to be called back should then say, 'Call me.' If the operator does not get this request after reporting the line busy, it will be assumed that the subscriber does not care to be called back and no record of the call will be kept. Briefly stated, busy lines will be called back for connections only when so requested by the calling subscriber."

COMPARISON IN INDIANA.

A COMPARISON of the new directories of the Indianapolis Telephone Company and the Central Union Telephone Company shows that the number of new Independent long distance offices in Indiana is 1,322, while the number of Central Union offices in the state is 411. The number of offices reached by the New long distance and not by the Central Union is 1,036, while the number of offices reached by the Central Union and not by the New long distance is 125. The number of offices common to both is 286.

LONG-DISTANCE SYSTEM OF MARYLAND CO.

THE Maryland Telephone Company is pushing the work upon the extension of its long-distance lines. Delays have been caused by the difficulty in securing right of way, but this has been generally overcome, and it is expected that the Western lines which will give long-distance connections with Chicago, St. Louis and Western cities, will be completed by the first of December. Special preparations are being made for the opening of these lines in the form of a convention at which all the prominent financiers and business men associated with the company will be present. The ceremonies will close with a banquet.

PORTLAND, ORE., TO REPEAL BELL FRANCHISE.

AN ordinance to repeal the franchise of the Pacific States Telephone & Telegraph Company, at Portland, Oregon, was recently introduced in the Council and referred to the judiciary committee. In addition to rescinding the rights granted to the present company the ordinance provides that the franchise be advertised and granted to the company offering the greatest inducements.

The service furnished by the Pacific States Company has not met with the approval of the citizens, and it is believed the commercial and business interests of the city would be better taken care of by an Independent company.

RAPID LINE CONSTRUCTION.

A RECORD in line construction was recently made by J. A. Driscoll, the newly elected president and general manager of the Wayne County Telephone Company and the Wayne-Monroe Telephone Company, of New York. It occurred to Mr. Driscoll that it would be advantageous to the patrons of both systems if they could be connected together to hear the election returns. The directors thought it impossible, as it required the building of seventeen miles of line, but Mr. Driscoll was not discouraged and at once put several gangs of men at work to dig the holes along the route between Lyons and Sodus. The poles reached the different localities on Thursday and Saturday. By continuous work from then on till Monday the line was completed.

The building of this line incidentally placed both the systems in communication with almost every village in Wayne county, and also with Rochester, Syracuse and Independent companies in Ontario, Seneca, Cayuga, Jefferson, Oswego, St. Lawrence and the counties in the Black River district.

A NEW NEW YORK COMPANY.

THE Oxford Valley Telephone Company, which was recently incorporated, will construct a system that will ultimately connect with every point in Chenango County, and form another system in the chain of exchanges which extend into every part of Central and Northern New York. At the present time connections will be made with the Marquis system at Norwich, on the north, and with the Chenango Valley Company, of Chenango Bridge, on the south. In this way long-distance connection will be made with Binghamton, Utica, Buffalo and other points.

CITIZENS' COMPANY, OF SIOUX FALLS, EXTENDING ITS SYSTEM.

THE new directory recently issued by the Citizens' Telephone Company, of Sioux Falls, S. D., gives a list of upwards of fourteen hundred local patrons besides the names of parties on farmers' lines in fourteen different divisions throughout the country. Long-distance lines are being built as rapidly as possible, which will greatly add to excellent quality of service which the company is now furnishing.

At the present time connections are furnished with all towns between Sioux Falls and Dell Rapids, Colton, Canton, Worthington, Minn., and on to St. Paul, Minneapolis, and La Crosse. Within a few days connection will be established with Salem, the line being now complete beyond Montrose and within thirty days the new line to Yankton will be in operation. The latter circuit is being built by the Independent Telephone Company, of Yankton, with which the Citizens' Company has a traffic agreement. Besides the long-distance service the company is continually adding new subscribers to its local system.

NEW SYSTEM FOR NEW BERN, N. C.

THE Home Telephone and Telegraph Company, under the direction of F. C. Toepleman, general manager, has recently installed one of the most up-to-date telephone systems in the country. The switchboard is central energy of the most improved type, and the line plant is built throughout under a multiple cable method of distribution, no open wire lines except the leads to the subscriber's premises being used. Over 18,000 feet of cable has been strung, which will give an ultimate capacity of 800 lines. At present only one-half is being used, but it was thought best to allow for future development. A particularly pleasing feature in the outside construction is the neatness of the pole lines, which reflect great credit upon the builders.

The power for operating the exchange consists of a one-horse-

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power motor, which drives an electric generator. This is used for charging a set of storage batteries that furnish the current for both signaling and talking.

When Mr. Toepleman first came here there were less than 100 subscribers and but one out-of-town line to Bayboro; now the Home Company operates seven long-distance circuits, which afford connection with the principal cities of the country. The plant was designed and the construction work carried out under the personal direction of Mr. Toepleman, in which he has been ably assisted by Mr. L. F. Wright, foreman in charge, and G. A. Barnes, W. S. Allen and Fred Smith.

TESTING OUT THE MEASURED SERVICE QUESTION.

MR. FRANK SAPP, who recently joined the forces of The Controller Company of America, as announced in THE AMERICAN TELEPHONE JOURNAL, has settled down to an interesting experiment in Sandusky, Ohio.

Frank Sapp.

Acting in behalf of his company, Mr. Sapp is going to test in an exhaustive manner the question of measured service versus flat rates. He will work in conjunction with Manager Carl C. Curtis, of the Sandusky Home Telephone Co., in an effort to demonstrate the superiority from a commercial and financial standpoint of the measured service system over the flat rate which is now exclusively in use in Sandusky. It is expected that the experiment will consume several months, and the results are certain to attract very general attention.

UNDERGROUND SYSTEM FOR PEOPLE'S COMPANY OF KNOXVILLE, TENN.

THE People's Telephone Company, of Knoxville, Tenn., is installing a complete underground system in the business part of the city. The cables used are of the most approved type, and vary in capacity from 50 to 200 pair. During the past season six carloads were purchased, all of which has been installed. As soon as possible the subscribers' lines will be transferred to the underground conductors and the aerial wires will be taken down.

INCREASES ITS SWITCHBOARD TO THREE TIMES ITS ORIGINAL CAPACITY.

THE Merchants' Mutual Telephone Company, of Michigan City, Indiana, will put in operation a new switchboard which will have a capacity of 2,400 lines.

This company has had an unusual amount of prosperity during the last year, which necessitated the new switchboard. This board is three times the size of the old one. The company will extend its line plant early next spring, having contracted for five miles of 200 pair cable.

UTICA HOME COMPANY MADE SPECIAL ARRANGEMENTS FOR ELECTION RETURNS.

THE Home Company, of Utica, New York, made special arrangements to give the election returns to its subscribers. In order that its patrons might receive the returns from other States and New York City, where it has no connection, arrangements were made with the Postal Telegraph Cable Company whereby it installed in the Home Company's building, beside the information operator's desk, instruments on its main lines, and a corps of operators. As soon as any telegraphic messages came over the wire, they were handed directly to the information operators, who then gave the information to the public asking for it. Special lines were run and extra information operators on duty assisted in order to give the public the quickest possible service.

THE MUTUAL COMPANY, OF DES MOINES, EXTENDS ITS SYSTEM.

THE Mutual Telephone Company, of Des Moines, Ia., has upwards of 2,700 telephones in service and is installing new instruments at the rate of about twenty a day. This company has made a number of improvements to its system and is now furnishing a telephone service of a higher grade than was ever done in Des Moines under the Bell regime. The long-distance service of the company is being extended and connections are made with a number of the rural lines in this part of the State.

C. H. Judson, probably one of the best known managers in the Independent field, has been secured to look after the business of the company. Mr. Judson formerly had charge of the system of the Home Telephone Company at Kansas City, Mo., where his knowledge of telephony and untiring energy brought the subscription list to a point beyond expectations.

MADISON, WISCONSIN, BENEFITED BY INDEPENDENT COMPANY.

THE following letters very plainly indicate that the people of Madison appreciate the service given by the Independent telephone company. Here, as elsewhere, the only losers are the Bell, who too late attempted to change their short-sighted policy.

"MADISON, Wis.

"Madison has been benefited in every way by the establishment of the Independent telephone plant, as far as my observation goes. The service is better than that given by the old company before the new one was established. One can have both telephones in his house or office for less than the old company used to charge for one. The rates are so reasonable that nearly everyone has a telephone, making the service of much greater value than before. In addition to the city list, we reach over the lines of the Independent company 1,000 subscribers in the villages and on farms in Dane County.

"E. RAY STEVENS,
"Judge Ninth Judicial Circuit."

"MADISON, Wis.

"I have been a subscriber of the Dane County Independent telephone system for a number of years and have found the service to be uniformly good. At the time of the installation of the Independent telephone system the Wisconsin Bell Telephone Company had a little over 200 subscribers, for which it was charging the rate of $50 a year and furnishing therefor an inferior service. Since the Independent telephone started the Bell Company has spent a large amount of money in rebuilding their plant, but seem unable to get a hold of the business. I am fully convinced that so far as telephoning is concerned that the business interests in the city of Madison have been greatly benefited by the construction of the Independent telephone system, and if I may judge from the rate charged in other cities by the Bell Company, where there is no competition, a large amount of money has been saved to the citizens of Madison. I think that the fact that there has been competition here has materially increased the number of subscribers for the Independent system, which in my judgment has resulted in a better quality of service. Further, there is in the neighborhood of 1,000 farmers throughout Dane County having connection with Madison over the Independent company's lines. From my experience in Madison I am fully convinced that if I moved to a city where the Wisconsin Bell Telephone Company had a monopoly I should favor granting an Independent franchise to any reputable firm applying therefor.

A. J. SCHMEFEMAN.
"Member of City Council."

At this time, when the agitation for Independent systems is being made in many of the strongholds of the Bell, these letters will be opportune.

CLINTON, N. Y., HOME COMPANY EXTENDS ITS SYSTEM.

THE Clinton Home Telephone Company, of Clinton, N. Y., has been making every effort to extend its system and at the same time satisfy the subscribers with gratifying results. Quite recently an exchange was opened at Westmoreland, and the people at Deansboro are asking for an exchange, promising fifty subscribers for a start. During the past year seventy-five new subscribers have been added to the list in this village and orders for others are being received almost daily.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

THE ANDERS PUSH BUTTON TELEPHONE.

It looks like a push button. Examine it closely and you find it's a telephone, and yet it is still a push button. This may sound paradoxical, but it is true nevertheless. This unique instrument, which embodies so many radical departures in the way of design and operation is manufactured by the EDMONSTONE COMPANY, of 105 Chambers street, New York.

So that the reader may gain a clear idea of what this instrument looks like we show herewith two illustrations. Fig. 1 clearly indicates the apparatus which performs the talking, listening and ringing functions, and Fig. 2 represents the assembled instrument in the shape of a desk telephone.

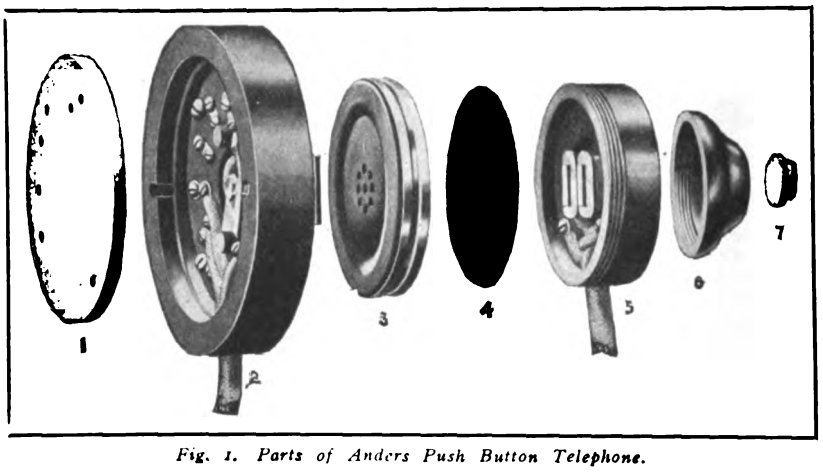

Fig. 1. Parts of Anders Push Button Telephone.

The various parts shown in Fig. 1 are as follows: 1, a fiber plate or bushing through which the wires pass before connecting to the terminals mounted on the transmitter base shown at 2. The terminals on the transmitter base include connections for the automatic switch, which is operated by the receiver. This is clearly indicated by the metal clips in Fig. 2. The receiver cap is shown at 3, and the diaphragm at 4. The receiver itself, which is made in the most approved manner with a bipolar permanent magnet and the highest grade of coils can be seen at 5. The push button cap and button 6 and 7 complete the parts.

A few words about the materials employed may be in order, as upon their quality depends a large measure of success. The transmitter is of the solid back type and consists of a self-contained holder of the button type. The granules are hard polished carbon and perfectly screened, so as to prevent odd sizes getting in and thereby tending to pack. The springs in the jack connections are of the best quality phosphor bronze and have rounded edges, designed to prevent breaking or cutting, and those used in the switch mechanism are German silver. The metal parts are all accurately machined, the utmost care being used in their selection.

This instrument is so designed as not to require readjustment with temperature changes. When the size of this little telephone is considered its most remarkable claim for originality in design is demonstrated. The diameter is but 3½ inches over all, and its extreme depth from front of push button to rear of base is 2¼ inches. Besides the type illustrated in Fig. 2, this instrument is made up in six other designs for wall and desk use, including a swinging bracket, which takes the place of the desk stand.

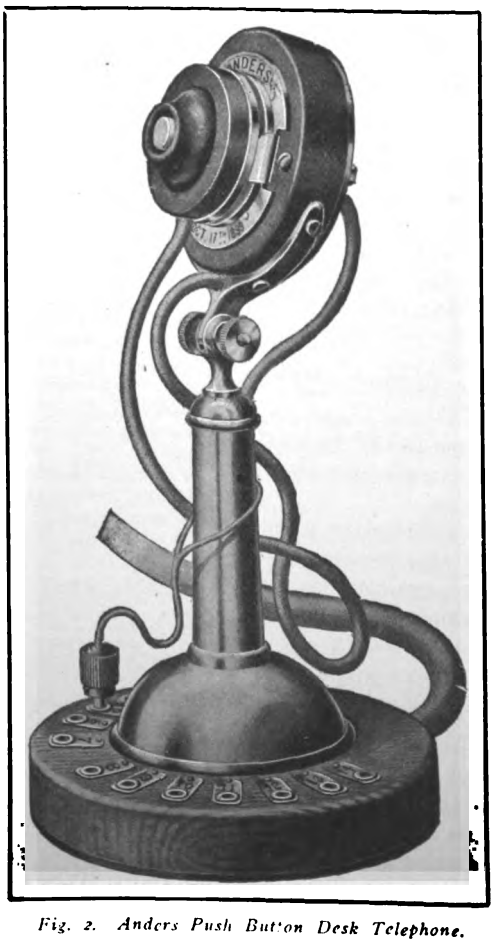

Fig. 2. Anders Push Button Desk Telephone.

The company will be pleased to furnish full particulars, and will take pleasure in mailing its descriptive booklet entitled Current Gossip to all parties interested.

THE RUMSEY AND SIKEMEIER COMPANY, of St. Louis, Mo., manufacturers and jobbers of telephone and general electrical supplies, recently issued the following circular to the Independent telephone trade:

"Believing that the telephone exchanges who realize the necessity of good telephones and switchboard apparatus, and who would prefer to procure such material from a St. Louis market fully realize such advantages to be obtained and would liberally co-operate with an industry for that purpose, we take pleasure in announcing to the patrons of the Eureka Electric Co., as well as others who have heretofore had to suffer owing to the lack of such market, that we have consummated arrangements with the Eureka Elec. Co. for the exclusive sale and handling of all their well-known instruments and other items of their manufacture in this territory. We at all times will carry in stock a full line of telephone and switchboard apparatus, and can therefore ship immediately upon receipt of all orders.

"This department will be handled in conjunction with our now well-known Electrical Supply Department, and will be represented by Mr. Herbert Rosenow, who for the past five years has been associated with the Eureka Elec. Co., and who is well acquainted and experienced in the telephone business as well as being well known to the telephone trade at large."

Mr. Rosenow, within a few days, expects to start on an extensive trip throughout the St. Louis territory, and expects to call at every telephone exchange with a complete line of samples.

THE BAIRD MANUFACTURING CO., 4 Michigan street, Chicago, has lately received an order from London for a quantity of its telephone toll counters. These little instruments are very convenient for use on switchboards for recording the

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—Telephone assemblers and switchboard men. Apply, giving full particulars, STROMBERG-CARLSON TEL. MFG. CO., Rochester, N. Y. 282

WANTED—The present address of Elmer E. Summey, formerly if not now interested in the telephone business at Utica and elsewhere. GEO. N. BURT, Oswego, N. Y. 279

WANTED—Position as manager or superintendent of Independent exchange. Am temperate, married, and have had four years' practical experience. Address Box 273, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 273

WANTED.—I am seeking a gilt-edged investment in some first-class telephone property. Not particular as to location, but must be shown before I buy. Address, Box 269, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 269

WANTED—Managers for two telephone plants of more than 1,000 telephones. Must have executive ability, a keen sense of modern business and be congenial in meeting the public. Address L. W. STANTON, 411 Electric Building, Cleveland, Ohio. 276

FIRST-CLASS wire chief desires position, with Independent company preferred. Experienced in central energy and magneto systems. Can furnish best of references. Address Box 281, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 281

WANTED—A first-class telephone electrician having had experience from bottom up; able to handle all troubles in exchanges, both inside and outside. Well up on toll line troubles. Write giving references, etc. THE SOLOMON VALLEY TEL. CO., Beloit, Kans. 274

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

SITUATION WANTED—Experienced cable man wants position. Understands underground construction, pulling cable and splicing or position in engineer's office; South or West preferred. Has been with present company three years. Desires change for increased experience. Address Box 280, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 280

AM open, any time between now and March 1, for position as superintendent or manager of exchange. Am, at present, managing a system built by me, but want larger field. Fifteen years' experience in all branches of telephone business. Would accept good position other than above mentioned. Best of references furnished. Address Box 268, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 268

(*Continued on page 31.*)

Satisfaction to Subscriber and Operator

is the one thing that has made

Baird Pay Stations

so well known and liked

These dividend makers make friends among the stockholders of every company which has them installed.

To those interested, our catalog and net price list will be sent free.

Baird Manufacturing Company

4 Michigan St., Chicago, Ill.

At least a carload of

TELEPHONE SUPPLIES

leaves our factory every day. Some days more than a carload; maybe two, or three. This gives an idea of the volume of our business. The reasons:

OUR SUPPLIES ARE THE BEST
OUR PRICES THE LOWEST
OUR DELIVERIES THE PROMPTEST

We make all line supplies in our own factory by machinery. We buy the rough material in quantities, securing special discount. We ship all orders direct from stock. Write us your specifications and see what we can do for you

HUBBARD & CO.

Murtland Building **Pittsburgh, Pa.**

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number of calls during any period and are extensively used in the United States by both Bell and Independent telephone companies.

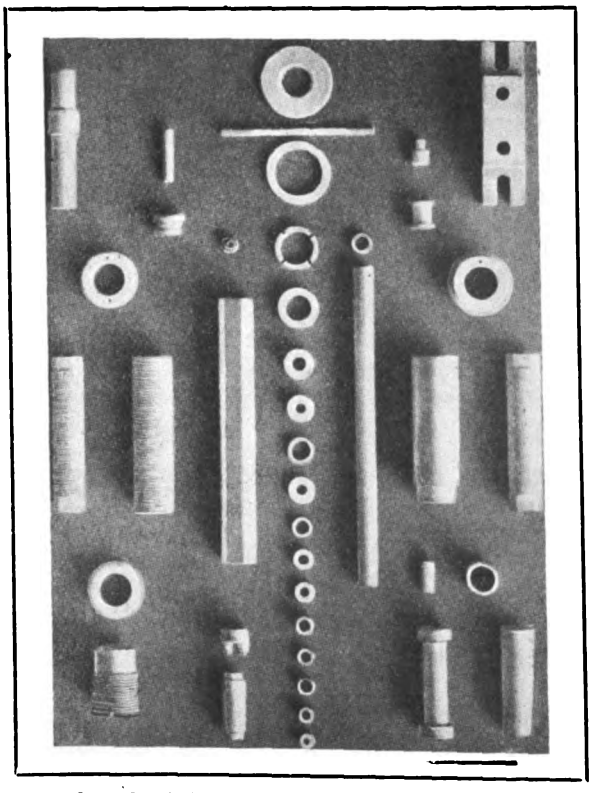
"LAVA" INSULATORS.

ONE page, showing specimens of "lava" for electrical purposes, is reproduced here from the handsome catalogue of the AMERICAN LAVA COMPANY, of Chattanooga, Tenn. They illustrate only a few of the hundreds of applications of this splendid insulating material in telephone and electrical work.

"This material," according to the catalogue, "is not, as is frequently supposed, a natural product of volcanic origin. It is the mineral Talc, which is machined in its natural condition and then baked under certain conditions of time and temperature to a condition of such extreme hardness that when properly kilned it can scarcely be cut except by diamond." Only in late years has lava been used to any extent in telephone work because of its former very high cost. The methods of its production have, however, been greatly simplified, with the result that it is about as cheap as any insulating material and more so than some of the best of them.

Lava is said to be acid proof, a better insulator and stronger than porcelain or glass. It can be turned cheaply in moderate quantities without the cost of dies or molds. It is frequently cheaper than wood, horn, fiber, compositions of rubber, etc., and is claimed to possess the desirable qualities of all of them, with none of their drawbacks. It lends itself to a variety of shapes in which mica cannot be employed.

THE AMERICAN LAVA COMPANY, Chattanooga, Tenn., will gladly receive inquiries from those interested, submit samples, estimates and other data.



Lava Insulating Specialties of American Lava Co., Chattanooga, Tenn.

W. N. MATTHEWS AND BRO., 619 Carleton Building, St. Louis, Mo., have gotten out another mailing card in the series devoted to the Stombaugh Guy Anchor. These cards have gained a great deal of praiseworthy notoriety not only from their droll composition but also from the pointed way in which the inferences are drawn with reference to this type of anchor. Mr. Entire Satisfaction draws attention to the peculiarities of the English language, using as an illustration the word "sleeper." After proving that whilst a sleeper sleeps in a sleeper running over sleepers a contingency might occur which would show there was no sleeper in the sleeper running over the sleepers under the sleeper. He continues to explain that the word "deadman" has another meaning besides the one with which it is generally associated, and that by substituting the Stombaugh anchor a man can go to sleep feeling assured that irrespective of weather conditions his line will not be disturbed and thus he can become a peaceful sleeper without having the worries of an insecurely buried deadman that is liable to move at any moment.

THE ARMOUR INSTITUTE OF TECHNOLOGY, of Chicago, Ill., is mailing a neat leaflet descriptive of its courses in telephone engineering in the evening classes during the year 1904-1905. This leaflet was prepared under the direction of Mr. G. W. Wilder, Professor in Telephony at the Armour Institute, and is particularly well illustrated with fine half-tone cuts showing views of the telephone experimental laboratories, and students at work in various departments. The leaflet will be mailed on request to anyone interested.

THE S. H. COUCH COMPANY, 156 Pearl street, Boston, Mass., has gotten up some advertising matter which is well worth the attention of all telephone managers. One of the most valuable articles in connection with inside wiring is the staple. This firm has for sale the Blake insulated staple which possesses some important features. First, its insulation. This is secured by means of a double fiber cap which is securely attached and at the same time affords perfect insulation. Then the head is made square, thus affording a good surface for driving purposes. These staples are made in two sizes, one ¾-inch for general use and the other ½-inch in length for use in hard wood. The price is but slightly more than for the ordinary kind and its advantages are so obvious as to counterweigh all considerations from the standpoint of price. The company will be pleased to furnish full particulars upon request.

THE AMERICAN STEEL AND WIRE CO., of Chicago, is circulating a booklet describing Sulphate of Iron (copperas) and its uses. By immersing lumber, timbers, posts, railroad ties, etc., in a hot solution of sulphate of iron, every part of the wood treated is impregnated, chemical changes take place, solidifying the core and fiber, thereby preventing decay and preserving the life of the wood tenfold. This process is approved by the German Government, and railroad ties, telegraph posts, etc., in Germany are now treated in this manner. It is more efficient than the ordinary treatment for preservation of wood, which treats the outside of the wood only and does not reach the interior core or fiber. By this same treatment wood can be rendered practically fire-proof. The company will furnish detailed information upon request.

THE CENTRAL ELECTRIC COMPANY, of Chicago, is taking additional floor space as a first preparation to making a more active campaign for business than in the past.

THE CONN. TEL. & ELEC. CO., INC., of Meriden, Conn., reports large sales of its 4-party selective system. This new system will interest all exchanges which are endeavoring to have their systems up to date. Its new biased ringer and master key are made

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THE MORRIS HARD FIBRE CLEAT

"Style A."
(Exact Size.)

For Twin or Parallel Wires.
Price $4.30 per 1000.

ONE screw is all that's necessary to fasten the **Morris Hard Fibre Cleat** for twisted pair and parallel wiring. Two screws are required with Wooden or Porcelain Cleats. This makes a great difference when 500 or 000 cleats are used in a day. It means a saving of half the time of the installer. It also means that from 500 to 1000 less screws will be used.

Style "C."
(Exact Size.)

For Corners.
Price $4.00 per 1000.

THEY **save time. They save money.** You are willing to do both. Then we should have your order now. The **Morris Hard Fibre Cleats** never break or wear out. They are Perfect Insulators. They **cost less** than Porcelain and outwear them twice over. About the same as wooden cleats, and outwear them ten times They are **smaller** and **neater** than all others.

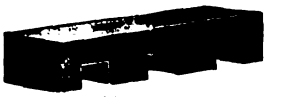
THIS being so, are not **The Morris Hard Fibre Cleats** worth using? Hundreds of Telephone Companies, both Independent and Bell, have already adopted them as standard for inside wiring.

Style "B."
(Exact Size.)

For Twisted Pair.
Price $4.50 per 1000.

THEY solve all inside wiring problems. Have you tried them? If not write to-day. Made in three colors, red, gray and black. Specify color, otherwise we will send red.

"Style D."
(Exact Size.)

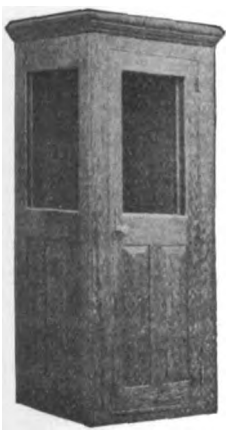


For Three Wires.
Price $6.50 per 1000.

We Gladly Mail Free Samples on Request.

THE MORRIS ELECTRIC CO., *Manufacturers of Fibre for Electrical Purposes.*

FOURTH AND SHIPLEY STREETS, WILMINGTON, DEL.



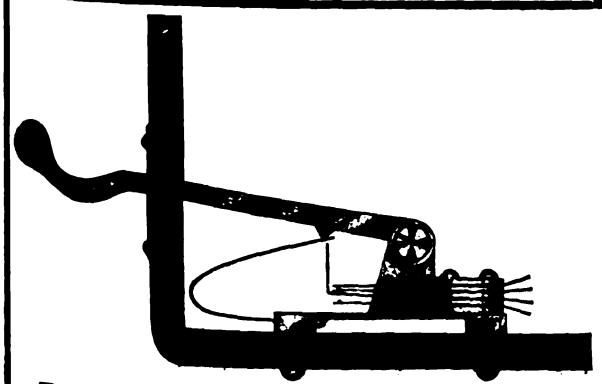
If you'll devote just five seconds of your time to thinking over the matter you'll understand why we say our

Sound-Proof Booths

cost nothing. Increased receipts pay for them in no time, and then all is clear profit.

Then devote sixty seconds more to writing for our catalogue and prices.

YESBERA MANUFACTURING CO., Toledo, Ohio



We call attention to our new style

SWITCH HOOK

which has been pronounced by experts as **ELECTRICALLY PERFECT.** Has four genuine platinum contacts and no pivot connections. Is perfectly **BALANCED** and **ENTIRELY SELF-CONTAINED.** In fact, it is right in line with the entire output of this Company, whose aim it is to keep their apparatus up to the highest standard of excellence.

THE WILLIAMS TELEPHONE & SUPPLY CO., **No. 73 CENTRAL AVENUE, CLEVELAND, O.**

Please Mention the AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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up in a thoroughly practical manner and will please managers who are looking for apparatus of high quality.

A TOLL CONNECTION REMINDER.

A NEW and novel idea for presenting to Independent telephone subscribers the fact that the Independent exchanges are connected by long-distance toll lines has been put into practice by the Inter-Ocean Telephone and Telegraph Company, of Buffalo, N. Y.

The idea consists of placing a neat and attractive celluloid sign immediately back of the mouthpiece on the transmitter. This reminder is before the subscriber every time he uses his telephone. The device is illustrated herewith, showing how it is placed on the transmitter behind the mouthpiece

This sign can be used universally by Independent telephone companies. Samples, together with other information, can be obtained by addressing the Century Telephone Construction Company, Buffalo, N. Y., the originators of the idea.

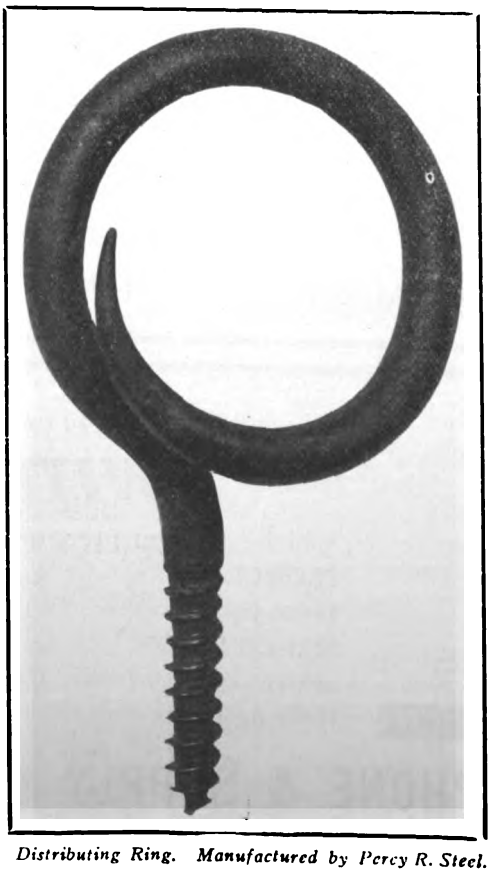
Toll Connection Reminder. Manufactured by the Century Telephone Construction Co.

M. LANZ & SONS, Pittsburg, Pa., manufacturers of galvanized and plain pole line hardware, have recently completed additions and improvements which enable them to produce pressed steel and malleable iron guy clamps, cross arm braces, bolts, washers, fetter drive lag screws, pole steps, pole seats, guy rods, rock anchors, thimbles, angle steel cross arms, etc., in greater quantities and at lower prices than heretofore, at the same time maintaining the high standard of quality for which their product is noted. They do their own galvanizing by the hot process, and use prime western spelter only, so that they have no difficulty in guaranteeing their product to stand the most rigid tests. Their factories are located amid the iron and steel mills, and their siding connects with all the railroads entering Pittsburg. They have been manufacturing bolts, hinges, etc., for the past forty years; began the manufacture of pole line hardware about fifteen years ago, at which time they erected their galvanizing plant. In addition to the articles mentioned above, they are prepared to furnish miscellaneous hardware, covering the other iron and steel articles used in pole line construction. They quote lower prices on specifications, giving quantities, sizes, etc., and they believe it to the advantage of prospective buyers to send them a complete set of blue prints, assuring them that all inquiries and orders will have the most careful and prompt attention.

THE DEAN ELECTRIC CO., Elyria, Ohio, has issued a booklet entitled "Transmitters and Receivers," which is the first of a series that will be distributed from time to time describing Dean telephone apparatus. Diagrams illustrating three different types of transmitters are shown, viz., Bell solid back, Reverse type solid back and Dean solid back. Attention is called to the Dean transmitter and deductions are made which claim superiority in design over the others. Among other important points in its construction and operation are simplicity, self-adjustment and inability to pack. The Dean receiver embodies all the most advanced ideas in design and has many points of advantage over others. Especial attention is drawn to the adjustment which is made irrespective of the shell, and also to the terminals for receiver cords which will grip any style of tip or the tinsel ends.

A NEW DISTRIBUTING RING.

THE items charged to construction of a system which represent the greatest outlay are those incidental to the building and maintenance of the line plant. It is, therefore, very evident that the manager who wants to make a good showing at the end of the year must be ever on the alert for new wrinkles which will tend to reduce this expense. Percy R. Steel, of 609 Commerce street, Philadelphia, Pa., has placed upon the market a type of distributing ring which has some points of merit worthy of consideration of the exchange manager. Although the general design is not new, yet it has some advantages not met with in others.



Distributing Ring. Manufactured by Percy R. Steel.

By reference to the illustration, the length of the screw will be noticed. This enables it to be used in places where the shorter length screw rings would not hold. For instance, in fastening to weather-worn woodwork the distance it can be driven in will insure a secure hold. The pointed tip of the ring allows a wire to be easily slipped through, thus saving time which, however small, in an individual case, becomes cumulative in extent where there are any number to be used. Besides possessing these advantages, it is made of a high grade of iron and is insulated with the best quality of enamel suitable for the purpose, thus adding high insulating qualities to its other points of superiority. Besides this specialty the firm manufactures all sorts of hardware for this class of work and each piece has an individuality that places it at the very top of the particular line which it represents.

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FILL in the GAPS

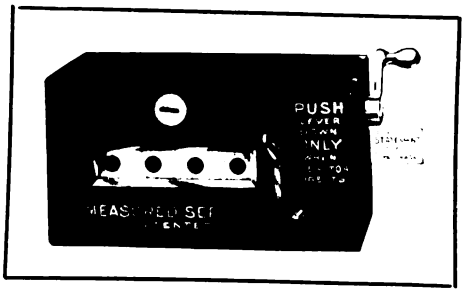
How many thousand yards of cable have you got without a subscriber's line attached to it?

Waste of Equipment.

Fill in with Measured Service.

Let the subscriber pay for what he uses.

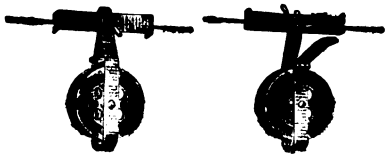
All Profit to You.



The Only Measured Service Meter.

Records at Subscriber's End and at Central.

Measured Service Co., 153-161 S. Jefferson St., CHICAGO



Security Cable Trolleys

(Patented), at $1.50 each, continue to sell in lots of 50 and 100 and less. The last lot went to Oklahoma.

THE F. BISSELL COMPANY

Manufacturers and Jobbers of Telephone Supplies.

TOLEDO, O.

MR. MANAGER:

Do you ever wonder how you can handle Rural Lines so as to give Subscribers satisfaction at a profit to the Company?

Do you realize that to give Rural Subscribers satisfaction you must, *first of all*, have "Central" answer their first call instantly.

Do you think you cannot do this unless at an increased operating expense?

You can handle more of these lines, by using

The T. & A. Selective "Central" Relay

with the operators you have and give incomparably better service.

Our system is for either Ground Lines, Straight Metallic or "Divided Circuit" Metallic Lines.

You do not have to Purchase New Telephones

WRITE TO-DAY FOR PARTICULARS AND PRICES

The T. & A. Selective Call Co.

Sole Manufacturers **GENESEO, ILL.**

WANTED

(*Continued from page 29.*)

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—Position with telephone company. I am an expert lineman and repair man; three years' experience; best of references furnished. Address P. O. Box 591, Toledo, Tama County, Iowa. 278

POSITION WANTED with telephone company. Have had three years' experience in inspecting and clearing trouble. I am energetic and capable, and not afraid of hard work. Can furnish references as to honesty and sobriety. Would prefer a position in the East. Address Box 283, THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 283

WANTED—A civil engineer. Must be a good draughtsman, methodical and accurate; familiar with cable and pole line construction and one who can handle men and meet the public in a congenial way. Position permanent; opportunity for advancement to the right man. Address L. W. STANTON, 411 Electric Building, Cleveland, Ohio. 275

WANTED—Position by manager. At present has charge of four exchanges, common battery and magneto. Has had factory experience, building and installing complete equipment. Understands handling of men and laying out complete installations. Have rebuilt exchanges and put them on paying bases. Will be open January 1st. Address Box 277, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 277

OWING to the limited number of copies carried on file and the large demands, back numbers of THE AMERICAN TELEPHONE JOURNAL will hereafter be sold for twenty-five cents per copy.

THE AMERICAN TELEPHONE JOURNAL,

116 NASSAU ST. **CITY OF NEW YORK**

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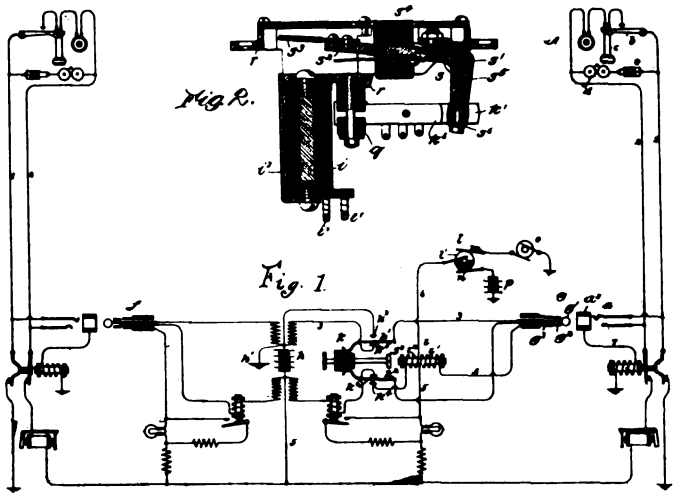
TELEPHONE PATENTS

MACHINE RINGING KEY.

W. W. Dean, Chicago, Ill., patents (No. 771,897) an improved automatic ringing key and assigns to Western Electric Company. The object of this invention is to provide an improved automatic ringing key which after being actuated continues to ring the subscriber until the latter removes his receiver. The circuit of the apparatus is illustrated in Fig. 1 and the general mechanism in Fig. 2. The operation of the system is as follows:

When the operator inserts plug *g* into spring jack *a*, a local circuit from battery *h* is completed from ground through conductor *5*, winding *i'* of the sticking magnet to shank *g3* of the plug and thence to the test ring of spring jack *a*, which is connected to ground by conductor *7* including the cut-off relay. The magnet *i* is energized and when the operator depresses the push



button of the ringing key, the armature *s3* sticks to the pole of the magnet, maintaining the key in the depressed position. The key connects the segment *l'* of the commutator *l* with the spring *k2* and grounds the other spring *k'* which is connected to the tip of the plug. As the commutator rotates, alternating current from the generator is intermittently applied and sent over the line. This alternating current passes through the magnet *i*, but it is so weakened by the high resistance of the bell, that its effect is not sufficient to unlock the key. When the subscriber removes the receiver, a low resistance path is provided which passing through the winding *i2* in the opposite direction to the current *i'*, neutralizes the magnet and releases the key.

TELEPHONE RELAY.

H. Carbonelle, of Uccle, near Brussels, Belgium, patents (No. 772,213) an improved telephone relay. This invention relates to an improved telephone relay. The inventor accomplishes his object by providing a kind of alternating current generator, having alternations so rapid as to be imperceptible as sound and the operation of this generator is arranged to re-enforce the sound waves which are set up by the transmitter.

IMPROVED SUPPORTING BRACKET FOR TELEPHONE SUBSTATIONS.

H. A. Barnes and N. E. Showacre, of Baltimore, Md., patent (No. 772,773), an improved supporting bracket for telephone substations. The object of this invention is to provide an adjustable bracket so arranged that it may sustain the transmitter and receiver in certain fixed positions in reference to each other so that they may be convenient to the lips and the ears of the users. The inventor provides two arms which are independently adjustable with reference to each other in both vertical and horizontal planes. To the ends of these arms, the receiver and transmittter are respectively attached.

ANTISEPTIC MOUTHPIECE.

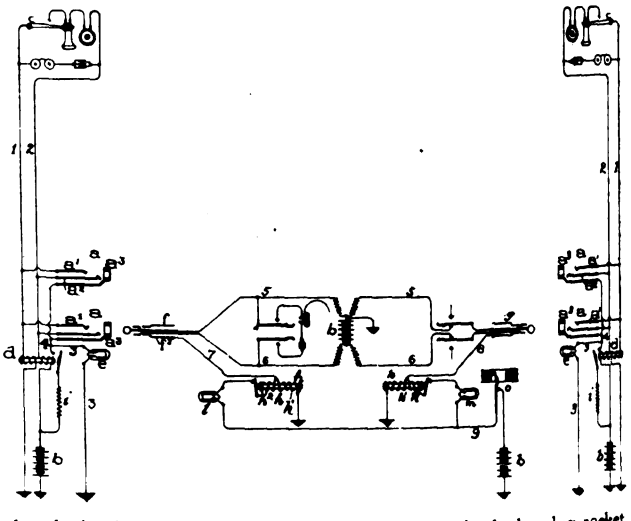
Mr. C. D. Wright, of Chicago, Ill., patents (No. 770,410). The inventor provides a paper mouthpiece for the voice trumpet of a transmitter, which is moulded in such a way as to spring over the circumference of the transmitter mouthpiece and thus be retained in place.

TOLL COUNTER FOR AUTOMATIC SWITCHBOARDS.

J. Erickson, of Chicago, Ill., patents (No. 772,459) an improved toll counter for automatic switchboards, and assigns to the Strowger Automatic Telephone Exchange. The object of this invention is to provide a toll counter which is adapted for use upon automatic switchboards. The inventor provides the usual set of numbering wheels for registering the number of calls, but in order to make the device operative with automatic switchboards, the register is so arranged that it requires several impulses instead of one to actuate it, and thus if more or less than the required number of impulses are given, no register is made.

IMPROVED SUPERVISORY SIGNALING.

Mr. F. R. McBerty, of Evanston, Ill., patents (No. 772,889) an improved supervisory signal, and assigns to the Western Electric Company. The object of this invention is to provide an improved supervisory signal for common battery switchboards. It is illustrated in the accompanying drawing. The operation of this circuit is as follows: When the receiver is removed, current flows through line relay *d*, closes local circuit *3* and illuminates line signal *e*, and puts battery on rings of spring jacks *b* by conductor *4*, thus providing a test. The operator inserts plug *f*, establishing the shunt *7*, *4* about the line signal lamp and extinguishing it. Magnet *h* is excited by current through winding *h'* cutting out the supervisory signal *h*. After learning the desired number, the operator inserts the calling plug *g* into the jack of



the desired subscriber. When this plug is raised, the plug socket switch *o* is closed, supplying battery to conductor *9* and when the plug is inserted in the spring jack of the called line, the circuit *4 3* is established. Until the party answers, the contacts of his line relay are open. Current flows from conductor *9* through supervisory lamp *m* by way of the armature and back contact of magnet *k* through both windings k^1 k^2 in the series. As these windings are differential and balanced, the supervisory is not extinguished. When the called subscriber removes his receiver the relay *d* is excited and increased current flows through winding *k'*, magnet *k* is unbalanced, cutting off the supervisory signal *m*,

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GEORGIA YELLOW PINE CROSS ARMS LOCUST PINS J. S. BOGGS :: :: ALBANY, GA.

MY CLAIMS: QUALITY, QUANTITY, QUICK SHIPMENTS. WRITE ME FOR ANYTHING YOU WANT IN THIS LINE.

Pendleton & Gilkey
816 Lumber Exchange,
Minneapolis, Minn.

POLE PR DUCERS.
We are producers and save you the jobbers' profit That's why our prices are lowest. A trial order will convince you. Also that our *White Cedar Poles* are the finest in the land. Write for prices F. O. B. your town.

CHESTNUT POLES
We wish to advise our old patrons and prospective ones, too, that we have again stocked up on poles, and have a fine lot of heavy long poles as well as fair stocks of short ones.
THE MEDORA MILLING CO., Medora, Ind.

BRACKETS--X ARMS--PINS
Little things it is true, but they cut a big figure in line construction.
OUR MOTTO IS:
Prompt Shipment—Quality Satisfaction—Right Price
COLUMBIA MFG. CO. ANTIGO, WIS.

Fetter Drive Screws & Washers
We Galvanize by Hot Process.
Manufactured by
M. LANZ & SONS,
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MONROE, MICH.
Telephone Poles
Wholesale Producers 20 Years Eleven Pole Yards

N. G. PINE CROSS ARMS
Locust and Oak Insulator Pins,
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Prompt Shipments. Write for Prices
The W. M. ABSHER CO.
North Wilkesboro, N. C.

J. W. Middleton & Co.
PUBLISHERS OF
THE INTER-STATE CORPORATION RECORD
Containing All Forms and Blanks For Organizing a New Corporation
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167 Dearborn St. CHICAGO.

We Rush Orders...
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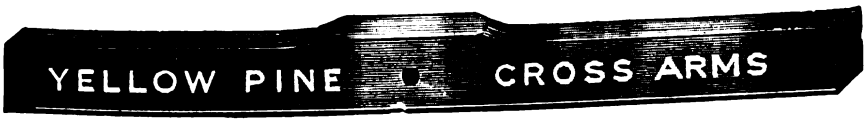

Oak Insulator Pins and Brackets

PRINCESS ANNE - - - MARYLAND

We Make a Specialty of Telephone Poles.
POLES
Large Stock
16 to 25 ft. 4 to 6 in. Tops
For Rural Lines
YARDS:
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POLES
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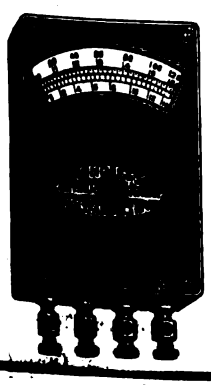
459-519 W 22d St.
CHICAGO, ILL.

You Will Find It Pays To Test



your lines periodically for insulation and resistance. This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone work and are low in price.

LOUIS M. PIGNOLET
78 CORTLANDT ST., NEW YORK
Originator of the Voltmeter Habit.

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THE WEEK'S MESSAGES

FINANCIAL.

ROCHESTER, IND.—The Rochester Telephone Company is building a line to Kewanna.

MARSHALL, MICH.—The Marshall Telephone Company will increase its capital stock from $15,000 to $50,000.

JASPER, MINN.—The Jasper Telephone Company has been purchased by the Enterprise Telephone Company.

STILLWATER, MINN.—It is proposed to establish a police telephone system in this city

NEW YORK, N. Y.—Julius G. Kramer has been appointed receiver for the Rosemont Electric Transmitter Company of 207 Green street.

BURTON, OHIO.—The Burton Telephone Company has increased its capital stock from $15,000 to $25,000.

LECK HILL, PA.—D. S. Leitzel and E. C. Tschopp have guaranteed the required amount of money necessary to extend the system of the Mahonoy & Mahantongo Telephone Company from Greenbrier to Leck Hill.

RACINE, WIS.—The directors of the Citizens' Telephone Company will expend $30,000 in improvements, consisting of a modern exchange.

FRANCHISES.

OCEAN PARK, CAL.—The Ocean Park city trustees will readvertise the telephone franchise.

MACKINAW, ILL.—The Farmers' Telephone System of Hopedale has applied for a franchise in this village.

ESTHERVILLE, IA.—The Emmet County Telephone Company has been granted a franchise in this city.

BANGOR, ME.—A franchise has been granted the Bangor Automatic Telephone Company.

GREENVILLE, ME.—The Moosehead Lake Telephone Company has been granted permission to construct and maintain a telephone line along the right of way of the Canadian Pacific Telephone Company, from this place to Hobb Station, in Somerset county.

GIRARD, OHIO.—S. C. Thayer has asked the Council to extend the terms of his telephone franchise until spring.

COOPERSBURG, PA.—F. S. Lewis, manager of the Lehigh Telephone Company, has applied to the Town Council for a franchise in this city.

DALLAS, TEXAS.—F. B. McElroy, who for some time has been endeavoring to secure an Independent telephone franchise in Dallas, has stated that he would contribute the funds necessary for holding a special election to decide whether the voters of this city desire an Independent telephone system. If the voters should decide favorable, there is very little doubt that the Council would grant such a franchise.

MONTPELIER, VT.—The Orange County Telephone Company has been granted a franchise to extend its system in this city.

COMBINATIONS.

SAYBROOK, ILL.—Robert Means has purchased the Saybrook Telephone Company, and Howard Means, his son, will take possession. The new company will be H. R. Means & Co.

WAYNESVILLE, ILL.—The Farm & City Telephone Company is reported to have purchased the J. M. Jeffrey line.

RICHMOND, IND.—The Brownsville & College Point Telephone Companies have united their lines and established an exchange at Liberty.

OAKVILLE, IA.—L. S. Erbes will purchase the Oakville Telephone Exchange. Mr. Erbes' address is St. Paul, Minn.

CLYDE, N. Y.—It is reported that the Wayne County Telephone Company will dispose of enough if its trunk line system to enable the Wayne-Monroe Telephone Company to give complete service from Rochester to Savannah.

LITTLE FALLS, N. Y.—A controlling interest in the Interstate Telephone Company of Little Falls has been purchased by the American Construction Company, which is heavily interested in the Schenectady Home Company.

WAYNESBORO, PA.—The United Telephone & Telegraph Company has sold its exchange at Waynesboro to a local company, composed of 102 citizens. The following officers were elected: H. C. Criswell, president; J. W. Wareheim, vice-president; J. E. Beck, treasurer. The new company will take possession about December 1st.

NEW COMPANY NOTES.

HOT SPRINGS, ARK.—The Hot Springs and Point Cedar Telephone Company of Hot Springs, has been incorporated with a capital stock of $2,000. L. B. Estes, president; C. H. Easley, vice-president.

TORONTO, ONT.—The Rainy River International Telephone Company, Ltd., capital $50,000, has been granted an Ontario charter. The provisional directors are: D. Robertson, J. A. Mathieu, P. P. Roberts, of Rainy River, and P. A. Smith, H. Williams, of Port Frances.

CARROLL TOWNSHIP, IA.—The Carroll Township Mutual Telephone Company has been incorporated with a capital stock of $4,992, by James Potter and others.

CLARE, IA.—The Farmers' Mutual Telephone Association of Clare, has been organized by W. S. Lyons, Gust. Baumchen, J. M. Hood, J. J. Condon and Henry Haulwick, of West Jackson, and D. S. Cougholn, G. C. Voigts, P. H. Cain, Bert Schuster, J. McElroy and J. D. Hood of Deer Creek.

DUNKERTON, IA.—The Blakeville Farmers' National Telephone Company of Dunkerton, Black Hawk county, Ia., has been incorporated, with a capital of $5,000. The officers are: President, C. W. Smith; vice-president, Martin Rinderknecht; secretary, William Rodger; treasurer, Sidney Weick.

CLINTON VALLEY, IA.—The Clinton Valley Farmers' Telephone Company has been incorporated with a capital stock of $1,000. C. W. Faust and others, incorporators.

HILL CITY, KAS.—The Mutual Telephone Company has been incorporated with a capital stock of $11,000. Construction will begin at once.

WHITEWATER, KAS.—The Whitewater Telephone Company has been incorporated with a capital stock of $15,000.

ISLAND FALLS, ME.—The Katahdin Telephone Company has been incorporated with a capital stock of $10,000. President, C. E. Milliken.

PORTLAND, ME.—The Wilson Long Distance Company has been incorporated with a capital stock of $250,000. The officers are: President, M. W. Baldwin, of Portland; treasurer, D. C. Knights, of Portland.

POWHATTAN, KAS.—The Powhattan Telephone Company has been incorporated with a capital stock of $15,000.

WEST GARDINER, ME.—The Woodland Telephone Company has been incorporated to conduct a telephone business in West Gardiner and surrounding towns. J. T. Collins, treasurer; F. S. Collins, president; H. E. Emery, clerk.

GOOD THUNDER, MINN.—The Pride Telephone Company has been organized, and will construct a line into Good Thunder.

WRIGHTSTOWN, MINN.—The H & W. Telephont Company has been incorporated with a capital stock of $4,995.00.

LAMONTE, MO.—The Lamonte Telephone Company has been incorporated with a capital stock of $5,000, and will soon begin the construction of a new plant here.

AKRON, OHIO.—The Citizens' Telephone Company of Akron, has been incorporated with a capital stock of $10,000, by J. W. Stearns, R. H. Beil and D. Heckerson, of Akron.

TONAWANDA, N. Y.—The L. M. Ericsson Telephone Manufacturing Company has been incorporated with a capital stock of $200,000. Directors, Axel Bostrow, Stockholm, Sweden; F. M. Parker, C. H. Smith, Buffalo, N. Y.

UTICA, N. Y.—The Independent Telephone Securities Company has been incorporated with a capital stock of $800,000. Directors are T. E. Ferris, C. H. Poole, of Utica; G. R. Fuller, of Rochester.

WINDSOR, N. Y.—The Lester Telephone Company has been incorporated with a capital stock of $2,000, by Wilber Brink, Levi Cresson and J. E. Kent, of Windsor.

BURTON, OHIO.—The Burton Telephone Company has increased its capital stock from $15,000 to $25,000.

CHESTER HILL, OHIO.—Chester Hill-Brown's Hill Telephone Company has been incorporated with a capital stock of $3,000, by Fred McInturf and Ed. Hopkins, and others.

MARIETTA, OHIO.—The Caldwell-Marietta Telephone Company has been incorporated with a capital of $25,000, by A. L. Gracey, John Kaiser and others.

NEW LYME, OHIO.—The New Lyme Telephone Company has been incorporated with a capital stock of $600.00, by M. A. Smith, F. Bishop, W. H. Reeve and others.

NEW ALBANY, PA.—The New Albany Telephone Company has been incorporated with a capital stock of $5,000.

WALTERBORO, S. C.—The Colleton County Telephone Company was given a charter to build a local exchange at Walterboro. T. B. Wheatley, president; F. Gray, vice-president and treasurer.

LEXINGTON, S. C.—The Lexington Telephone Company has been incorporated with a capital stock of $1,000. J. B. Kaughman is president.

ALVIN, TEXAS.—The Alvin & Ingleton Telephone Company is building an extension of its line into Friendswood, Texas.

WAITSBURG, WASH.—The Waitsburg Rural Telephone Company has been organized with the following officers: J. M. Morgan, president; Gus Vollmer, vice-president; W. N. Brooks, secretary; A. M. Phillips, treasurer; D. M. Denton, Walter Price and Frank Jonas, trustees.

MISCELLANEOUS.

PAWNEE, ILL.—A new telephone service between Pawnee and Morrisonville has been established. The line was constructed by the exchanges of the two towns jointly.

MONROE CITY, IND.—The Wabash Telephone Company has installed a new switchboard to accommodate its growing list of patrons.

SOUTH WHITLEY, IND.—The Farmers' Mutual Telephone Company has now seventy-eight telephones in operation, and has completed two metallic circuits to Columbia City, where it has installed a switchboard.

EAST DUBUQUE, IOWA.—The Standard Telephone and Telegraph Company has installed a new switchboard in this city.

SHAKOPEE, MINN.—The Merchants & Farmers' Telephone Company will issue their first directory next month and regular paid service will be begun.

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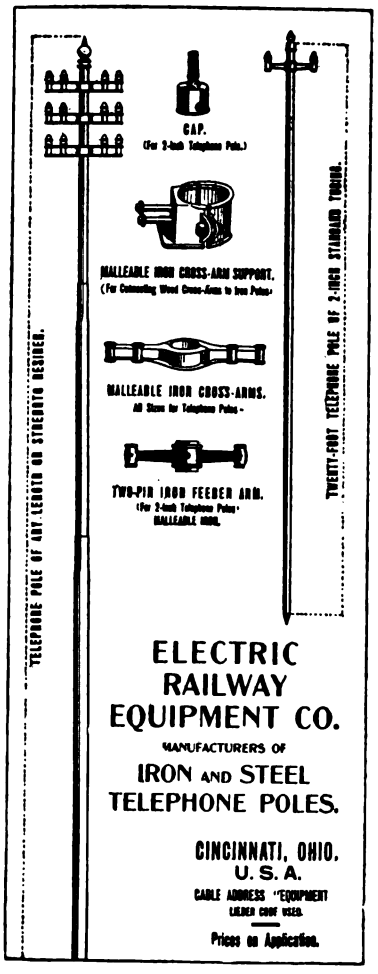

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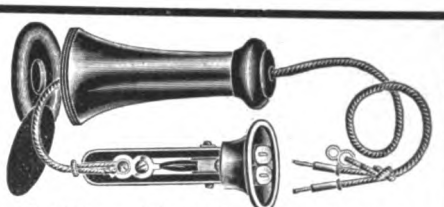

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ALBANY, N. Y. The Independent Union Telephone Company of Buffalo, has changed its head office to Albany.

STITTVILLE, N. Y.—A farmers' telephone line has been built from Camroden to the office of E. D. Jones of the village. A number of farmers have already been connected.

LONDON, ONT.—The city has installed an automatic telephone fire alarm system.

OIL CITY, PA.—The Petroleum Telephone Company's Exchange was recently damaged by fire to the extent of $20,000.

SEATTLE, WASHINGTON.—The City Council has passed an ordinance for a new twelve-circuit repeater for the improvement of the fire alarm service.

FON-DU-LAC, WIS.—The local telephone company expects to have its new switchboard in operation by December 1st.

UNDERGROUND.

MADRAS, INDIA.—J. B. Gibbons, a representative of the Oriental Telephone & Telegraph Company, a corporation of London, England, and operating telephone systems in India and other Asiatic countries, recently surveyed the telephone systems of the Madras Presidency, with a view to installing underground cable systems.

COLORADO CITY, COL.—The El Paso Telephone Company will construct about twelve blocks of underground cable system in this city.

AUBURN, ILL.—The Interstate Telephone Company has been granted a franchise to construct an underground system in this city.

PEORIA, ILL.—The city is considering placing its fire alarm and police wires underground.

MEXICO CITY, MEXICO.—The Mexican Telephone Company will install an underground conduit system.

NILES, MICH.—The South Bend Home Telephone Company contemplates installing an underground system in this city.

OBITUARY

JUDGE J. M. THOMAS, the first president of the National Telephone Association and one of the pioneers in the Independent field, died at his home at Irvington, N. Y.

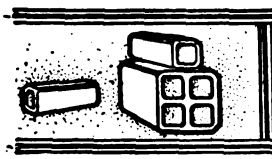
ELECTIONS.

WINDSOR, ONT., CAN.—The directors of the recently incorporated Ontario Independent Telephone Company are: C. W. Taylor, J. R. Brooks, J. A. McRae, P. F. Chisley and A. D. Prosser.

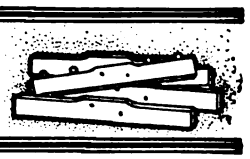
COLUMBIA CITY, IND.—The Whitley County Telephone Company elected the following officers: S. J. Peabody, president; J. E. Remington, vice-president; W. Magley, secretary and treasurer.

HARRIS, OHIO.—Levias Glassburn, of Bedwell, has been elected president of Telephone Line No. 10.

THURMAN, OHIO.—M. J. Williams has been elected secretary of No. 1 Moriah Telephone Company in place of F. W. Evans.



New Construction in the Field



GAINESVILLE, FLA.—The East Florida Telephone Company will extend its system this winter.

SOUTH WHITLEY, IND.—The Farmers' Mutual Telephone Company has seventy-eight telephones in operation, and contemplates making a number of extensions.

NEW HARTFORD, IA.—The Farmers' Telephone Company is replacing all its poles with ones thirty-five feet in length, on account of increased business.

MANHATTAN, KAS.—The Riley telephone line will be extended in the near future.

WAYNESVILLE, KY.—The Fayette Home Telephone Company is constructing a line from Lexington to this city, where it will connect with the line of the United States Telephone Company.

DIXMONT, ME.—The Unity Telephone Company will extend its line this winter.

RIPLEY, ME.—Dr. Moulton will extend his telephone line this fall.

SABATTUS, ME. The North Eastern Telephone Company, it is reported, will build a telephone system in this village.

HARTLAND, MINN.—The telephone line is to be extended North and West.

LESTER PRAIRIE, MINN.—A new forty-five-drop switchboard has been placed in the local telephone office.

LE SUEUR CENTER, MINN.—Work will soon be commenced on the construction of the Cleveland telephone line.

MELROSE, MINN.—The Melrose Telephone Company has moved its exchange into larger quarters, and has made several extensions to its system on account of growing business.

REDWING, MINN.—Headquarters have been chosen for the new telephone company, of which D. M. Neil is the local manager. Arrangements have been about completed for the construction of the plant.

SPRINGFIELD, MINN.—The telephone line from here to Confrey is completed.

WHITE BEAR LAKE, MINN.—The Farmers' Telephone line will be constructed at once.

COLUMBUS, MISS.—The Citizens' Long Distance Telephone & Telegraph Company will undertake extensive improvements to the telephone system in the near future.

LIMERICK, MO.—The Ossipee Valley Telephone Company has extended its lines to South Limington.

KALISPELL, MONT.—The Kalispell Water & Electric Company has decided to construct a telephone line from here to the Northern Pacific Railroad.

DIXON, NEB.—A movement is on foot to establish a local telephone system.

HUMBOLDT, NEB.—The Humboldt Telephone Company is laying cables to accommodate rural patrons.

SEWARD NEB.—The Seward County Telephone Company will install a system in this city at once.

HUDSON, N. H.—A. S. Andrews and H. A. Andrews are building a telephone line in Londonderry.

TILTON, N. H.—The Citizens' Telephone Company is stringing new lines and putting in many new telephones at Northfield Center.

ARGYLE, N. Y.—The Commercial Union Telephone Company has erected its line and expects to have it in operation shortly.

BARTON, N. Y.—The Ross Hill Barton Independent Telephone Company, at a recent meeting, appointed a construction committee, and the building of lines will be commenced at once.

ENDICOTT, N. Y.—The York State Telephone Company will establish an exchange in this village.

HAMDEN, N. Y.—The Launt Hollow Telephone Company is extending a new line to Walton. It has been planned to extend the line in the spring from Walton to Rock Raft, where it will connect with the Cannonsville-Deposit line. The company at present has its headquarters in Hamden, but it is likely that the main office will be moved to Delhi in the spring. Ralph Anderson, of Hamden, is president of the company.

LESTER, N. Y.—The recently incorporated Lester Telephone Company will build lines on the north to Hudson, southeast to the State line, and northwest to Binghamton.

CANDO, N. D.—The wiring of the telephone extension north of St. John is being completed as fast as possible. Connection with Considine has been established.

GRANVILLE, N. D.—An Independent telephone line will be established between this village and Mohull.

JAMESTOWN, N. D.—The new telephone line to Buchanan is expected to be in operation in a few days.

WAHPETON, N. D.—The Tri-State Telephone Company will extend its system in this vicinity.

COLUMBUS, OHIO.—The New Long Distance Telephone Company of Indianapolis, will build a toll line from this city to Hope.

DANVILLE, PA.—C. V. Amerman is contemplating establishing a Rural telephone system in this vicinity.

GEIGERTON, PA.—The Conestoga Telephone Company will run a new line from this place to Plowville.

HARRISBURG, PA.—The New Albany Telephone Company will build telephone line from New Era, Bradford county, to Evergreen and New Albany, and also from Overton, Bradford county, to Campbellsville, Eldredsville, Estella and Forksville, Sullivan county. The directors are R. S. Wilcox, R. Decker and S. D. Sterigere, of New Albany, and others.

HONESDALE, PA.—The Stroudsburg & Bushkill Telephone Company will extend its system to Portland.

MARTINSBURG, PA.—The Roaring Springs Telephone Company will build a line from this place to Williamsburg.

NEW HOLLAND, PA.—The Enterprise Telephone & Telegraph Company will extend its line in the near future, and make connections with the Conestoga Rural Telephone Company, operating in the vicinity of Morgantown.

SCRANTON, PA.—The Northeastern Pennsylvania Telephone Company is extending its lines throughout this vicinity.

BOONSTEEL, S. DAK.—Work is in progress on the construction of a line from here to the new town of Gregory.

DEADWOOD, S. DAK.—The Home Telephone Company will overhaul its system and make several improvements.

HUDSON, S. D.—The Hudson Telephone Company will extend a branch line across the State line into Iowa.

IRENE, S. D.—The Independent line is built as far as Volin and will be run into Irene in the near future.

PIERRE, S. D.—Work has been commenced on the Cheyenne River reservation. Two lines are to be built, one from White Horse Camp and the other from Cherry Creek.

CREWE, VA.—It is stated that the rural telephone line being built through Nottoway and adjoining counties will come into Crewe and connect at the present central office with the local line.

ST. JOHNSBURY, VT.—The Citizens' Telephone Company is extending its line to West Danville.

BELMONT, W. VA.—The Belmont Telephone Company has recently installed a new cable line.

BENWOOD, W. VA.—The National Telephone Company is building a number of new lines, including one to Sherrard.

CADOTT, WIS.—Mr. Ole Jenson, owner of the Cadott Telephone Company, will extend the system from Stanley to Thorp, and build other rural lines.

SPRING VALLEY, WIS.—During the next year a new rural telephone line will be built by the farmers in this vicinity from this place to Menominee, and another line to Glenwood.

APPLETON, WIS.—The Fox River Valley Telephone Company has completed its new line to Hortonville. It is the intention of the company to run lines through different parts of the county.

WHEELING, W. VA.—The Belmont Telephone Company has extended its lines and it is now possible to reach Steubenville. They will make connections with East Liverpool in a short time.

BELMONT, W. VA.—The Belmont Telephone Company is extending its lines with aerial cable.

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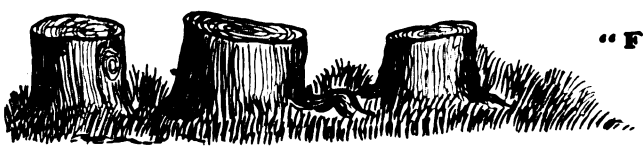

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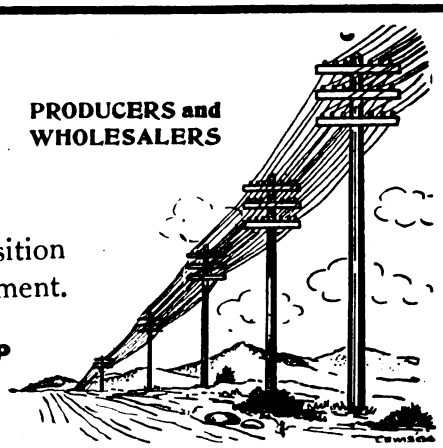

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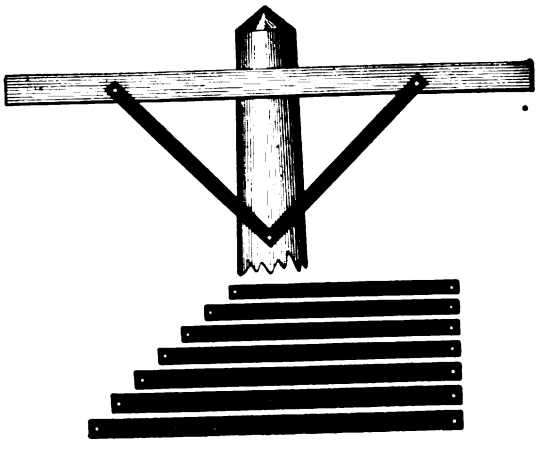

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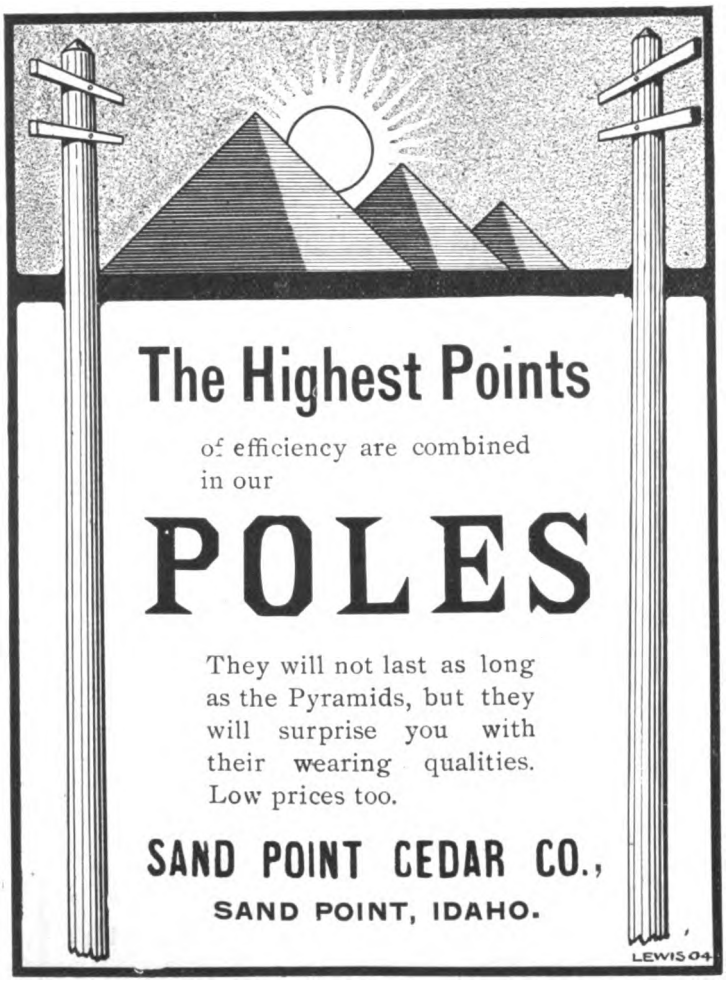

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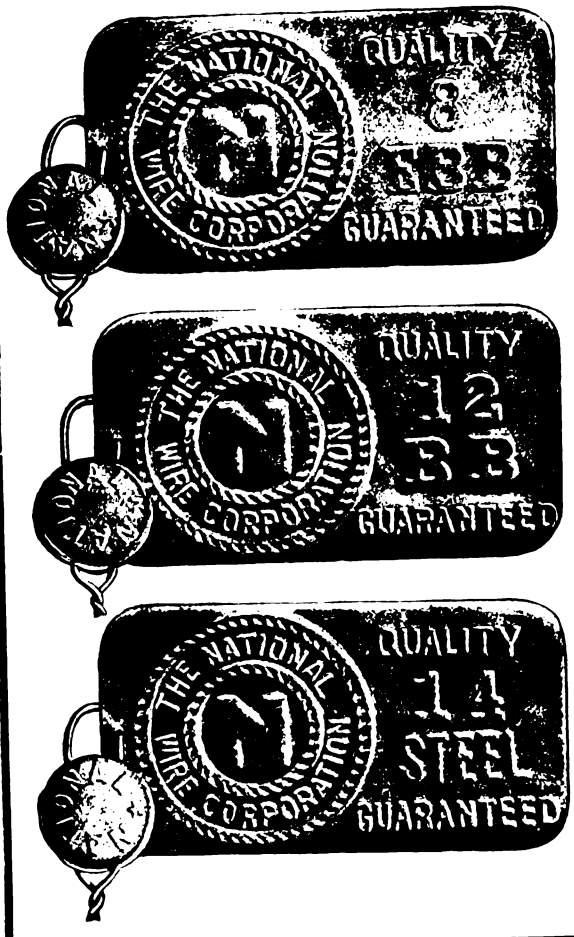

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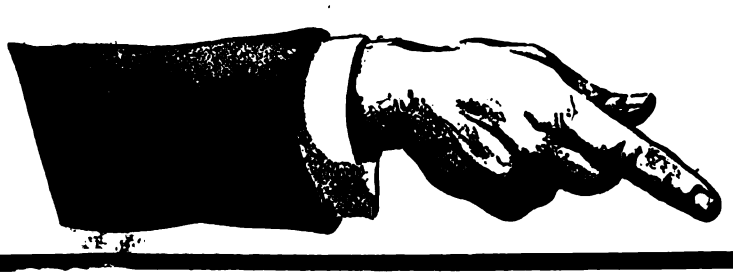

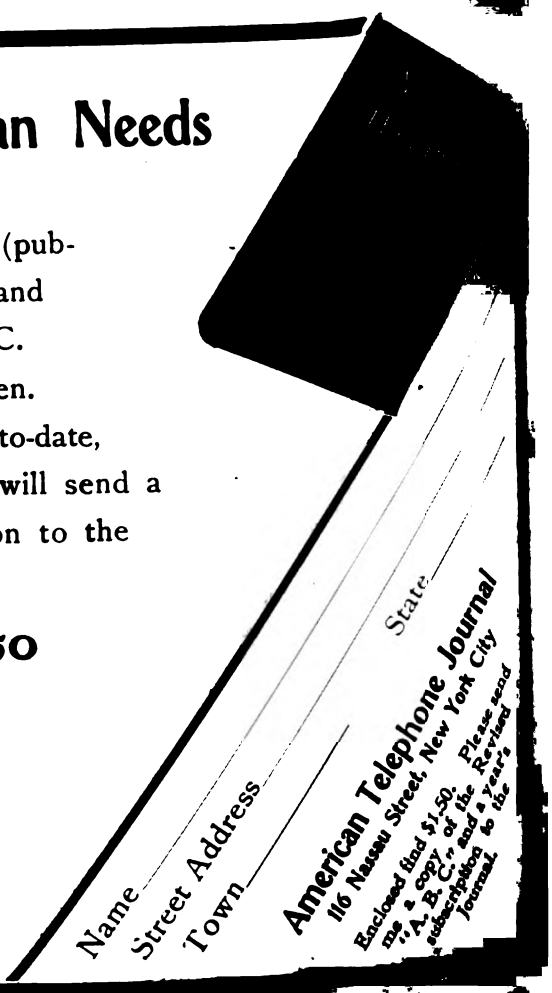

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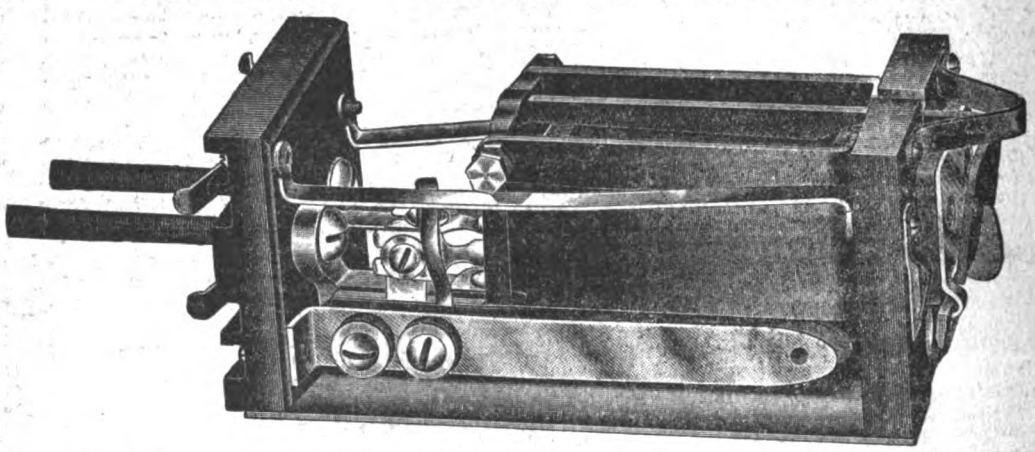

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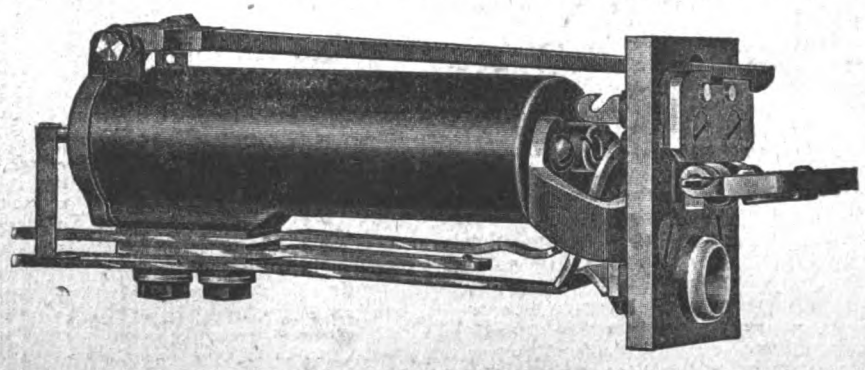

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PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—NOVEMBER 26, 1904—CHICAGO Number 22

PUBLISHED WEEKLY ONE DOLLAR A YEAR

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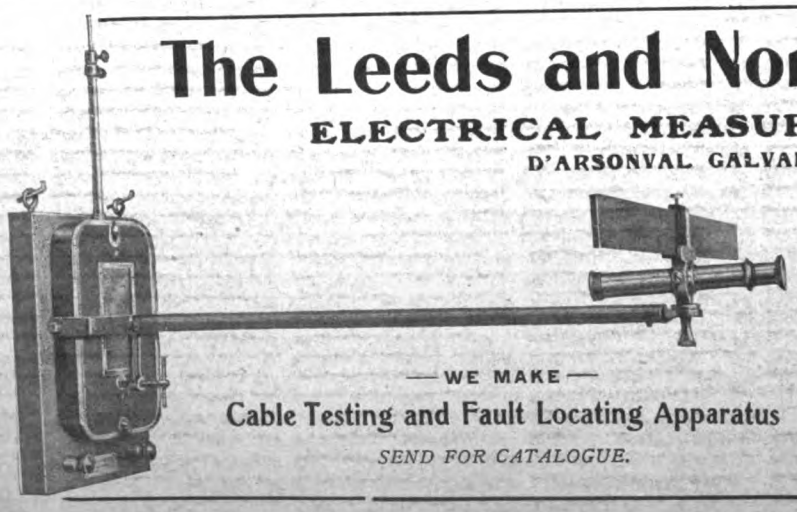

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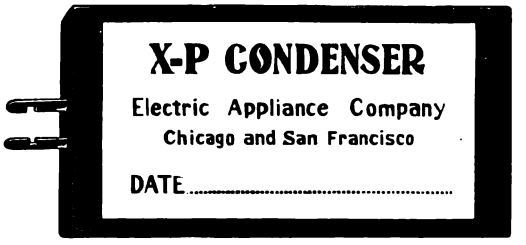

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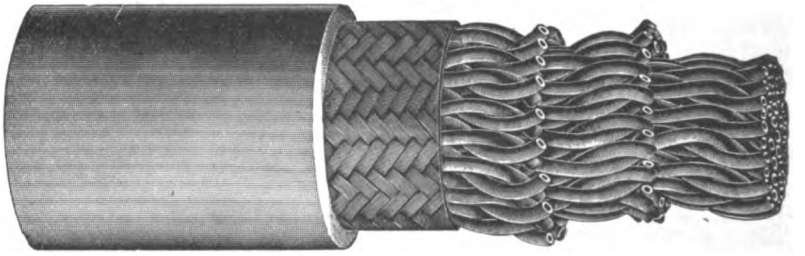

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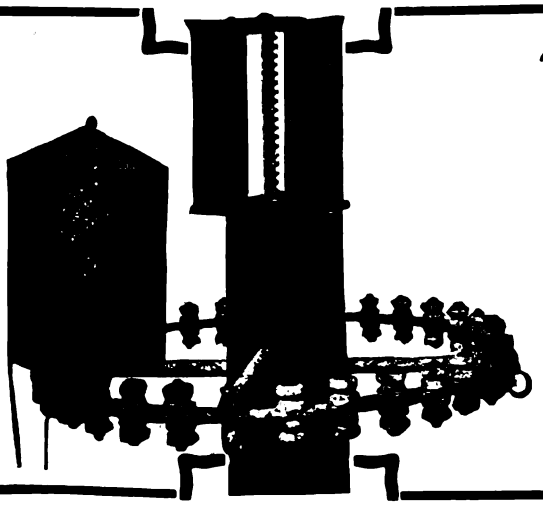

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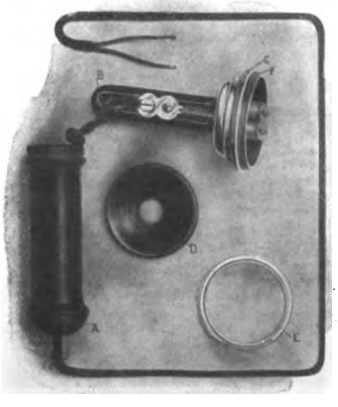

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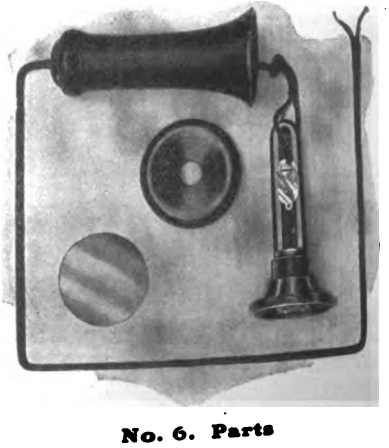

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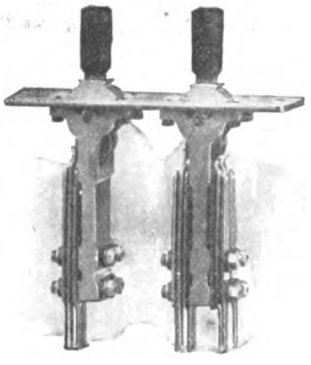

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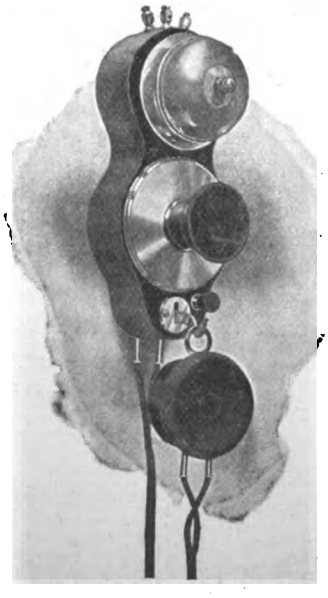

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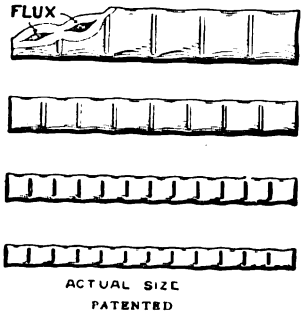

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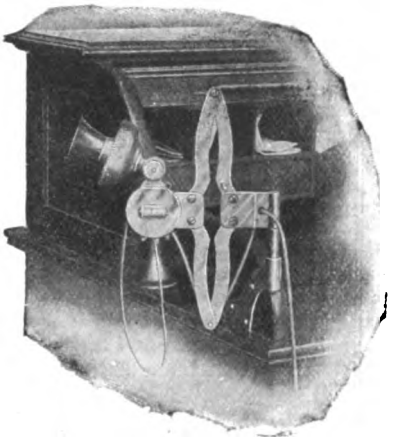
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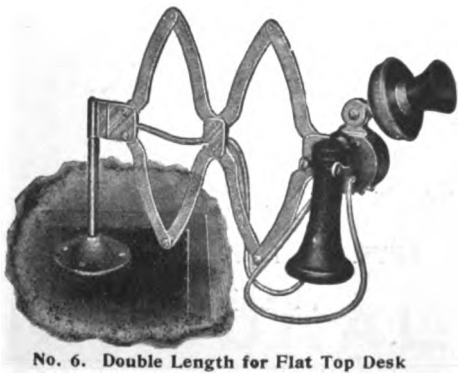
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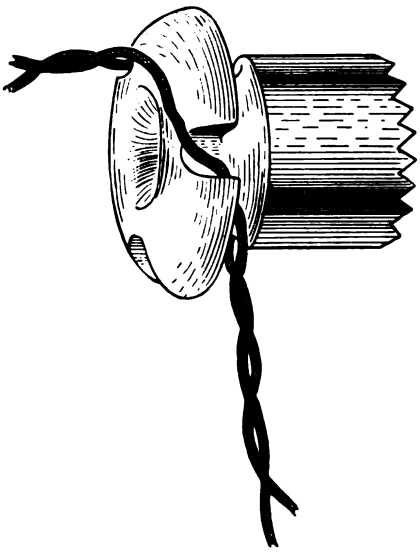

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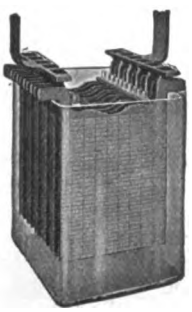

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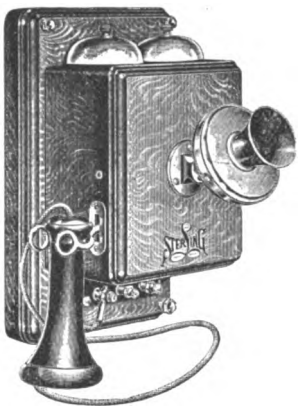

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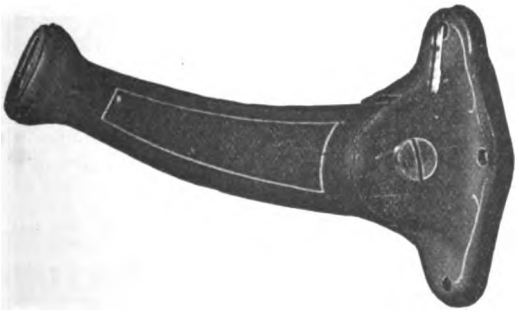

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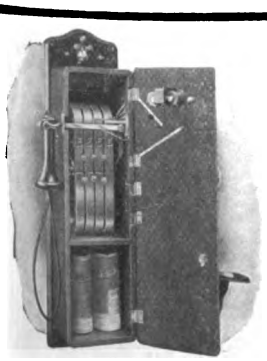

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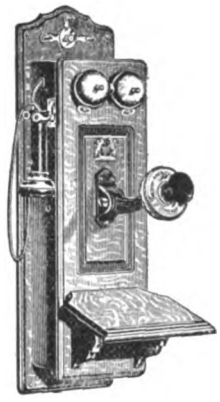

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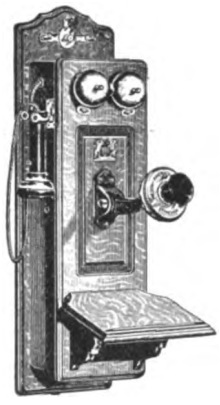

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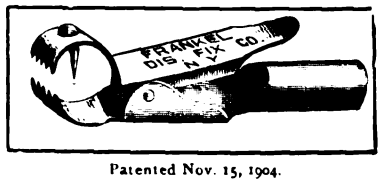

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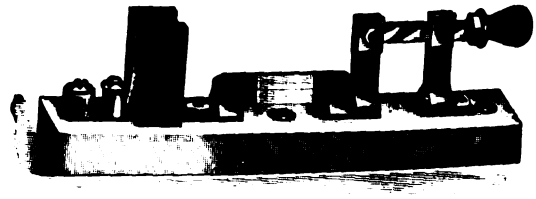

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VOLUME 10 SATURDAY, NOVEMBER 26, 1904 NUMBER 22

THE TELEPHONE ON BOARD WARSHIPS

By Dr. Alfred Gradenwitz.

THE telephone is being more and more widely adopted for military purposes, and is assuming an important role, especially on board warships. Now, whereas for many other applications the existing types of telephone had only to be slightly modified, a thorough alteration was necessary to adapt them for marine purposes, and many interesting new features had to be developed by the inventive skill of the engineers who took charge of the matter.

The acoustic or speaking tube which formerly was exclusively in use for transmitting commands on board war vessels could not be replaced by telephones before the telephonic transmission of sounds was rendered so intense that orders arriving could be received, even if the listener were three feet or more from the apparatus. This result obtained, the adoption of telephones offered the advantage over acoustic tubes of being applicable for longer distances, allowing conversation to be transmitted to several receiving stations simultaneously, and finally of being independent of the relative situation of the various telephonic posts.

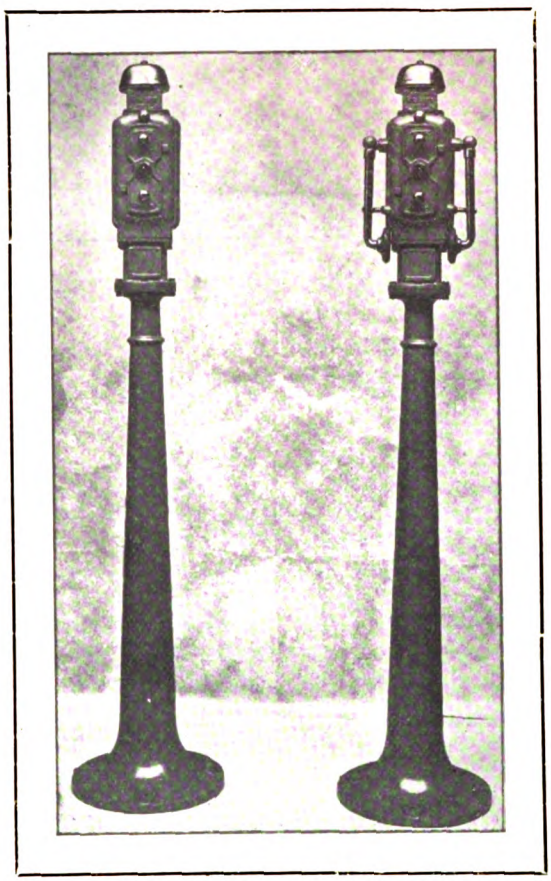

Fig. 1. Marine Telephones for German Warships.

In telephone plants on board ships the lines start from one central station, leading radially to the various telephones distributed throughout the vessel. Now, instead of utilizing switches in the central station in order to talk to any one of the substations, the circuits of the latter should be kept permanently closed, thus every telephone line terminating in the central station should have its own individual apparatus. The central commanding place and the conning tower being protected by armored plates are generally used as telephone central stations, both being so connected with one another by inserting switches as to allow the telephone loops being used from either of them.

In addition to telephone lines connecting two telephones, the necessities of ship service, and especially the control of the artillery fire, entail the necessity of several substations communicating simultaneously with the commanding central.

Telephones on board ship are being used for the following purposes:

1. For transmitting orders relative to the course of the ship and its control.

2. As artillery telephones, leading from the commanding central to the various gun positions.

3. Finally, for manœuvering the ship torpedoes.

The firm of Mix & Genest, of Berlin, Germany, has devoted especial attention to the development of telephones for military purposes, and has fitted a large number of men-of-war with their apparatus. The microphone used by this firm embodies a further development of the short and long-distance transmitter used by the Imperial Postal Department in Germany, that allows of a considerable acoustic intensity. This microphone consists of a contact piece provided with annular grooves, in front of which the carbon is located. The grooves are filled up with carbon powder, while a strip of cloth placed against the back contact piece and stuck at the same time to the carbon plates, effects the lateral closure of the grain chamber. As the diaphragm is set vibrating, the carbon powder is submitted to alternative compressions and expansions, while the soft cloth strip and a central wool brush conveniently dampen the oscillations.

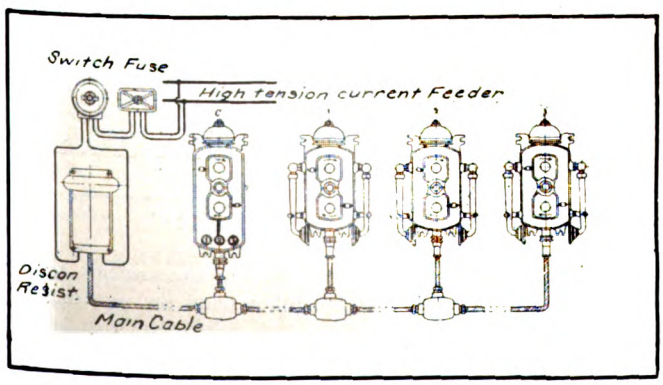

Fig. 2. Connections of Marine Type Telephone.

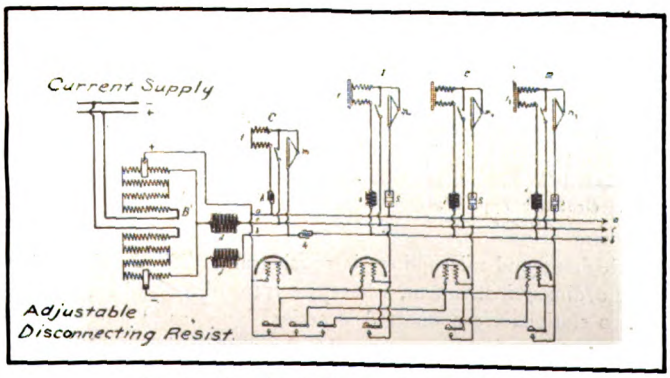

Fig. 3. Circuits of Marine Type Telephone.

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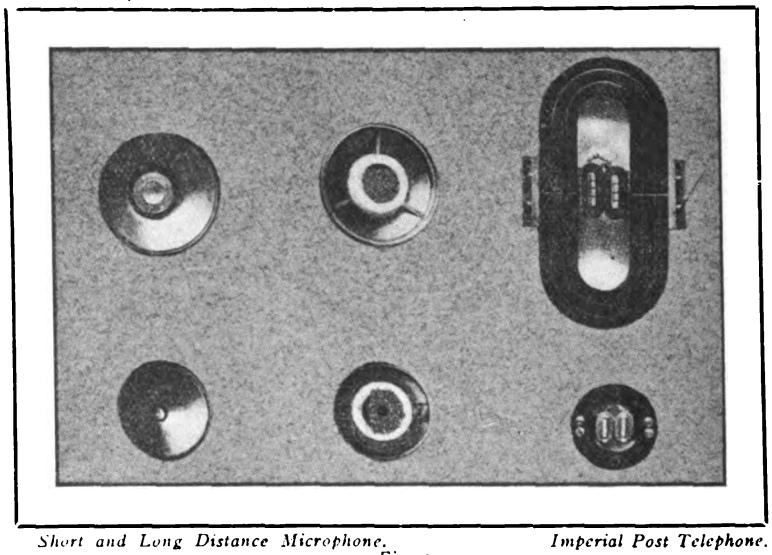
This microphone has been further developed into the so-called Stentor microphone, intended for high tension operation, by increasing all dimensions and transforming the grain chamber. The latter is filled with a considerable amount of big grains of hard carbon, the lateral closing being effected by a fireproof mica ring, surrounded by a damping ring made of fine felt. As the Stentor microphones are exposed to large currents, slight arcs are frequently produced, which could set the damping device on fire but for the protective mica ring. The diaphragm is of aluminum, to which a small carbon plate is riveted so secured to the curled edge of the capsule as to prevent any strain. The normal current of the Stentor microphone is 20 times greater than that of the short- and long-distance microphone of the Imperial Postal Department, while its stability is satisfactory because of the large amount of carbon granules it contains. The microphone obtained by this modification allows of a far greater acoustic intensity, while the clearness is only slightly impaired.

Stentor Microphone. *Stentor Telephone.*



Short and Long Distance Microphone. *Imperial Post Telephone.*

Fig. 4.

In a similar way the loud-speaking telephone combined with the microphone has been transformed by increasing the magnetic field. In Fig. 4 is shown the system of a loud-speaking Stentor telephone, comprising 6 magnets, compared with the German postal telephone, both being represented in their proper dimensions.

These modifications result in increased acoustic effects, but the increased efficiency of which is lost, however, to a great extent as soon as the telephone and microphone are enclosed in a wood or metal box. Similar disturbances are noted when the microphone is submitted to overloads, or to external electric effects. When machine current is used in place of that desired from accumulators to operate the microphone these disturbances are particularly noticeable, since the current from a direct-current dynamo is by no means perfectly continuous, owing to the fluctuations due to the short-circuiting and opening of the armature coils at the commutator of the machine.

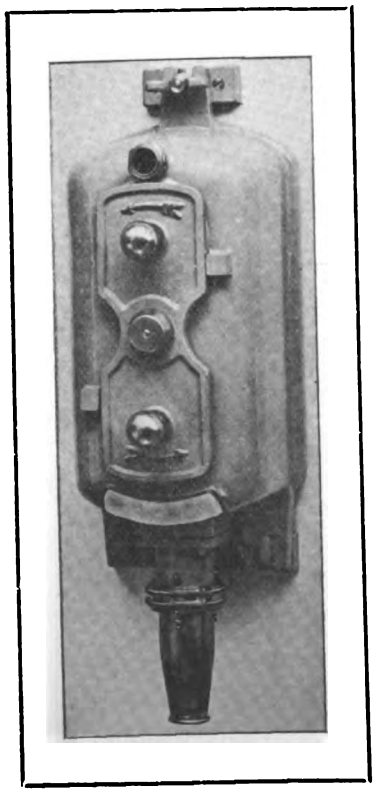


Fig. 5. Ordinary Type Marine Instrument.

Now the current may be smoothed out, as it were, for microphone operation by means of reaction coils, which dampen the fluctuations, and by connecting a condenser parallel these fluctuations can be further reduced.

The mutual connection of the telephone and microphone is considerably different from that of the ordinary instrument, where the transmitter and receiver of the two stations are connected in series. Now, as at any moment only one station is being spoken to, the other being used for listening, all others will always be out of service, hampering the full development of the alternate current waves. This is obviated in the loud-speaking telephone by the three conductor systems of Fig. 7, where the principle of inserting in each closed circuit only one transmitter with a receiver has been carried out.

The diagram of connections for stationary loud-speaking multiple telephones, as developed by the Mix & Genest firm, is simple, being based on the fact that every microphone circuit of the above kind can generate sounds of such energy as to be susceptible of electrical distribution over a number of parallel branches, if a sufficiently loud-speaking equipment is used.

As seen from Figs. 2 and 3, the central station is connected with the different secondary station exclusively by three conductors (*a b c*), every receiving station, and accordingly the central station itself being fitted only with one microphone and telephone. Between *a* and *c* are placed in parallel the microphones *r*, p_1, m_1, etc., of the various secondary stations, as well as the telephone *t* of the central station. Between *b* and *c* in parallel to one another is the microphone *m* of the central station *C* and the telephones, t^1, t^2, t^3, etc., of the secondary stations, as shown. This arrangement imitates the familiar three-conductor systems. In the latter the whole of the battery current, including its fluctuations produced by speaking against the microphone membrane, traverses both the microphone and the telephone connected in series as well as working battery. In the present arrangement a separation is made so that the continuous working current traverse the microphone, while the telephones placed in parallel are prevented from receiving the continuous current by the condensers *k*. This results in the fluctuations superposed on the continuous current being led through the condensers *k* and the telephones *t*, t^1, t^2, etc., while on the other hand reaction coils *d* will prevent a possible diversion through the current source *B*. The reaction coils thus prevent on one side any disturbing fluctuations of the machine current against the telephone and on the other hand the weakening of speaking current oscillations on a path other than that leading through the telephone. The speaking energy is thus exclusively supplied to the hearing telephone, the undiminished intensity en-

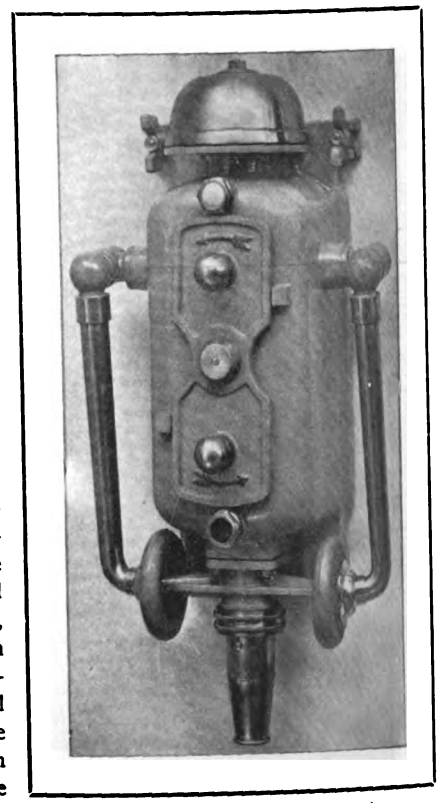


Fig. 6. Instrument for Noisy Locations.

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suring an especially pure and intense transmission of conversations.

The objection could be raised that the various stations are more dependent on one another than in the usual method, so that in the case of a station being destroyed by the fire of the enemy, the operation of the remaining stations would also be impaired. In order to exclude this, the main cable (*a b c*) common to all the stations, together with its accessories, is effectively protected by armored plates, the secondary stations are first exposed to destruction. The fuses *s* and the small inductive resistances *i* have therefore been inserted into the branch circuits of the latter. Should any

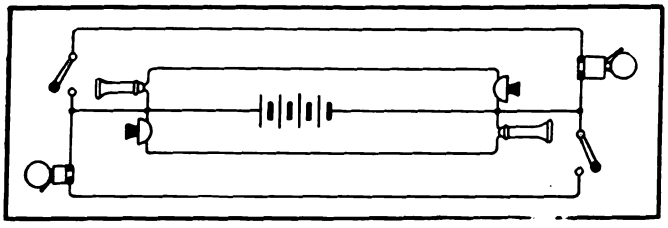

Fig. 7. Three Wire Circuit of German Marine Telephone.

branch circuit loop be short-circuited by the effect of the fire a weakening of the microphone-feeding current through the same would be prevented by the fuses *s*, while on the other hand, a diminution of the speaking current through the short-circuit is prevented by the resistance coils *i*. Experiment has shown this arrangement to be very effective, doing away with the mutual dependency of the various stations.

The calling apparatus, with its conductors, should be electrically independent of those intended for speaking. The arrangement provided for this will be readily understood from the diagram, and is not different from the usual scheme, apart from independence of the conductors. The central station may call any of the secondary stations, while any one of the latter is able to call the former without signalling any station not concerned.

As regards the constructive design of the apparatus a watertight enclosure, extreme solidity of the casings and movable portions ensuring the safety of the microphone and telephone against mechanical injury, and the safeguarding of the conductors are the most essential points to be considered. The instruments represented in Figs. 5, 6 and 7 show some different designs of marine telephones, those in Fig. 6 with lateral hearing tubes being intended for noisy rooms. The locking shield seen in front is common to all, being turned into a horizontal position during use. This shield is intended on one hand to protect in the state of rest both the telephone (upper opening) and microphone (lower opening) in the casing; on the other hand, it switches in the microphone into the circuit; and, finally, by rotating the microphone capsule immediately before speaking, the granular carbon is stirred violently, thus ensuring a permanent, satisfactory operation of the microphone. The instruments may be fitted also with glow lamps serving as a signal of a preceding call.

HINTS ON RURAL CONSTRUCTION

ARTICLE I.—(CONTINUED).

BY P. A. PRICE.

ALWAYS keep a record of the corners in estimating the number of poles, so that extra poles can be left there for guying purposes. Short poles will answer for these "guy stubs," as they are called, but they must be long enough to plant firmly and give the guy wire good clearance over the roadway. Heavier poles for the line are desirable for corners, and also to be placed on each side of creeks which are to spanned by the line. If the waterway be very wide, say two spans, the poles should be double armed on each bank. When the route crosses a railroad, permission must be obtained from the railroad company to cross their

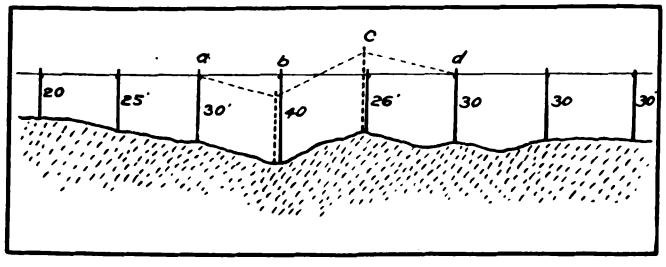

Fig. 3.

right of way, and the wires must be erected at a height that will preclude any possible chance of their being in the way of men on the cars. The laws governing the crossing of railroads by electric companies prescribe certain requirements that must be complied with, and a thorough understanding with the railroad company in question should be had before any work is done. All wires crossing railroads should do so from double-armed poles, or in case no arm is used, two brackets should be placed side by side for each wire. In some States this is compulsory, and it is a good idea to follow in any event.

In case the route passes through swampy ground, or through partially submerged land, note should be made of this in a record, since it may be necessary to use special methods of construction.

From twenty-five to thirty foot poles are desirable when there is no expectation of more than two, or three arms at the most, being used. High poles are more costly, and are more liable to injury from sleet and wind, and for country lines thirty foot poles are very satisfactory. No matter what height may be selected, it

Poles 145 to 196 pass property. John Smith, n. side road.
" 150-155, heavy trimming needed. O. K. by Smith.
" 160, 20 ft. guy stub.
" 161, guy to tree. O. K. by Smith.
" 170, 40 ft. pole for grade.
" 171, 40 ft. pole for grade. e
" 173-180, cut down trees. O. K. by Smith.
" 186-190, marsh.
" 213-214, cross P. & I. R. R. Right of way granted.
" 213, 35 ft. double arm.
" 214, 35 ft. double arm.
Note—Be careful of signal wires.
" 372-430, property Henry Jones, n. side road.
" 372, guy to anchor for cross from s. side road.
" 380, 25 ft. for grade.
" 381, 25 ft. for grade.
" 387, trim as necessary. O. K. Jones.

Fig. 4.

is always advisable to "grade" the line. This means to have no sharp dips or raises in the wires, and can be arranged by keeping note of the topography or surface of the country. In Fig. 3 is illustrated a graded line over uneven ground. Where there is but two or three feet difference in a span it is hardly worth bothering about, but if there is any decided difference, as is the case from *a* to *d* in the diagram, and *b* and *c* where forty and twenty-six foot poles are used, one can readily see that it would destroy the uniformity of the line to a great and

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injurious extent. Most of the big telephone and telegraph companies grade their lines whenever possible, and one of the telegraph companies goes almost to extremes in this regard. It pays in the end, for there is little liability of the wires pulling a pole out of the ground by contraction, or of getting loose from their tie wires and swinging up in the air above the pole top from the same cause. So a more or less careful grading of the line should be attempted, and note made of the proper height of the poles at the time the route is gone over.

As you go over the route, try, if possible, to find out whose property you are passing, and note how many poles will be placed on this property line. Sometimes a right of way will be refused on one side of the road and readily given by the party opposite. A thorough understanding with the property owners regarding right of way, trimming and guying privileges will make the construction of the line much easier of accomplishment, and while the telephone and telegraph companies always have the "right of eminent domain" in their mind, it sometimes happens that the property owner has a few ideas of his own about the use of the highway. And again, the company may save a lot of unprofitable, roundabout road construction by allowing a right of way across a pasture. It is, in most cases, desirable to keep on the road, as the farm may change hands and the new owner object in after years, and besides, a highway line is more easily maintained; but that is a question for the company to decide.

In going through villages, the necessary formalities must be taken as when you are building through your own town, and all requirements complied with.

A record of the route would look like the diagram we illustrate in Fig. 4.

TESTING BY MEANS OF A VOLTMETER

By Arthur Vaughan Abbott.

Editor's Note.—The Editor of The American Telephone Journal is so constantly the recipient of inquiries with reference to the methods of making electrical measurements with a Voltmeter that he is taking this opportunity of answering inquiries by the wholesale, and simultaneously to suggest, to such of the subscribers to the Journal as are likely to have occasion to desire information upon this subject, that it would be advisable to preserve this number of the Journal, because in the future it will be difficult to supply duplicate copies.

A VOLTMETER is in reality nothing but a galvanometer, and modern forms of this instrument are so designed as to be easily portable, and to be dead beat in their readings. The Voltmeter is an instrument of so universal applicability that no telephone exchange, no matter how small, should be without one; and every wire chief will find it greatly to his advantage to become thoroughly familiar with all of the short cuts in electrical testing, to which the Voltmeter so readily lends itself, because with such familiarity he will be almost instantly ready to take up and locate any cause of trouble as fast as it may arise.

The Voltmeter is supposed to measure electrical pressure, and so it does; but it accomplishes this feat indirectly, because the Voltmeter measures the amount of current that traverses the instrument and not the voltage or electrical pressure which produces it.

The most common form of the portable Voltmeter is shown in the accompanying illustration in Fig. 1. The mechanism of the instrument is exhibited in Fig. 2. This illustration shows the ends of a horseshoe magnet, which forms the foundation of the instrument. Between the poles of the magnet a needle is pivoted, which swings over the scale of the instrument, shown in Fig. 1. This needle swings in jeweled bearings, held in by two brass nuts, the upper one of which appears in the illustration. Around the axis of the needle is placed a coil of fine wire, which is traversed by the current that passes through the Voltmeter. Two spiral springs, which also appear in the illustration, tend to keep the needle at the zero mark. When the current passes through the coil, the mutual reaction of the current and the magnet causes the needle to swing away from the zero point with a force which is directly proportional to the product of the current and the number of turns in the coil. Hence the greater the current the greater will be the deflection of the needle; consequently, in reality, the

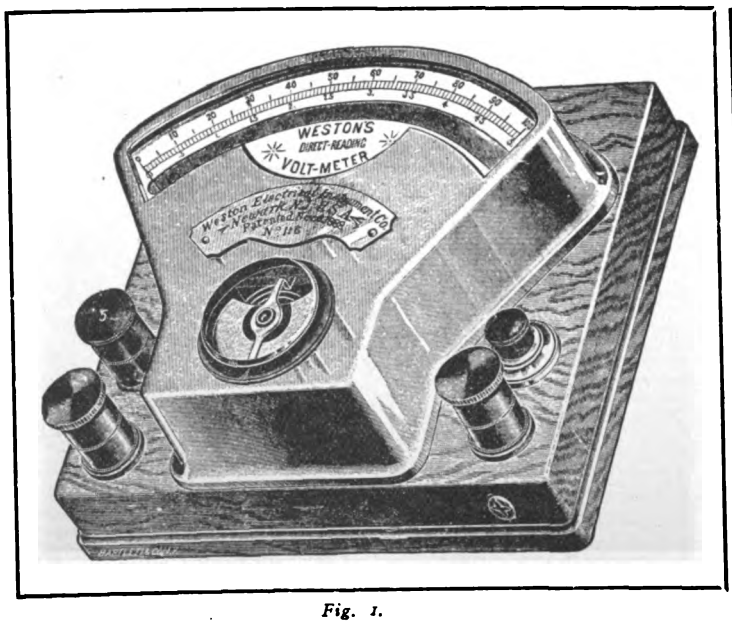

Fig. 1.

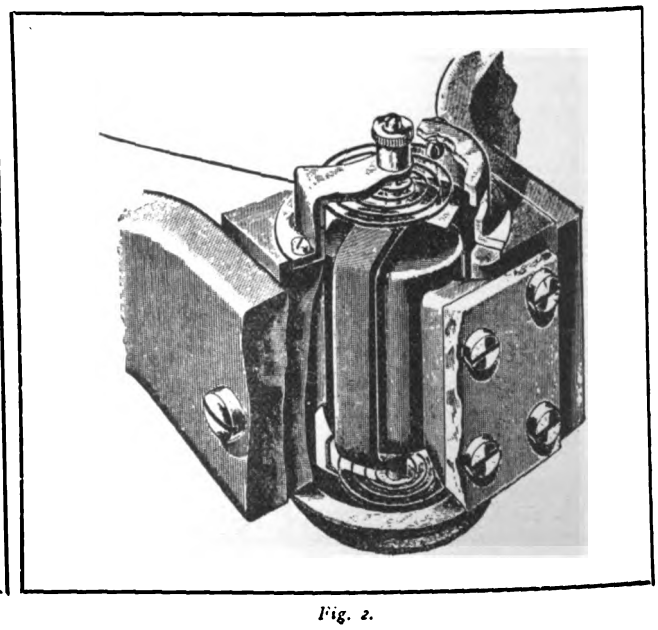

Fig. 2.

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divisions on the scale of the Voltmeter really represent current strengths in the swinging coil.

If one refers to Ohm's formula $C=\frac{E}{R}$ it is seen that the current is directly proportional to the electromotive force divided by the resistance; hence so long as the resistance remains constant the current will be proportional to the electromotive force which produces it; and thus if a measuring instrument, like a Voltmeter, be wound to a certain definite resistance its scale can be graduated to show electric pressure as proportioned to the current which traverses its coil. This is the principle upon which the Voltmeter operates. The instrument is usually wound with so large a resistance that the quantity of current which traverses the coil is exceedingly small: For example, a Voltmeter to be used on ordinary lighting circuits will have a resistance anywhere from 10,000 to 50,000 ohms; and so, if placed upon a 110-volt circuit, the current in this coil will only be a few thousandths of an ampere. From the foregoing, it is easy to see that the scale upon a Voltmeter will only be correct so long as the resistance of the instrument, or rather so long as the resistance in the entire circuit of the instrument,

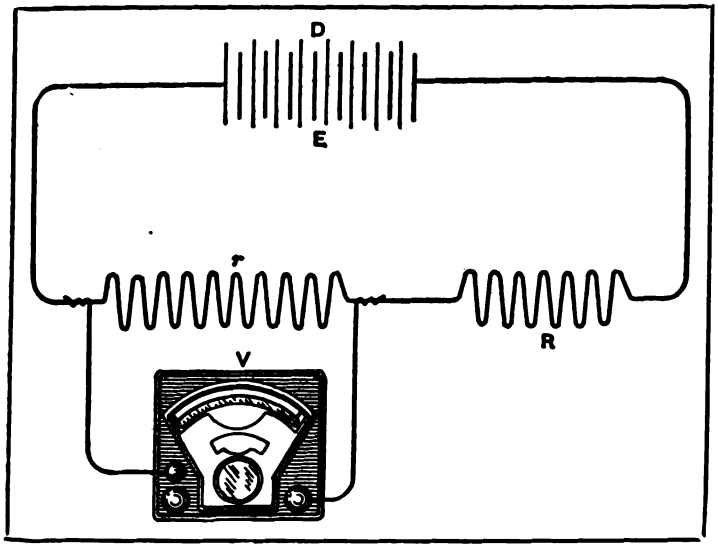

Fig. 3.

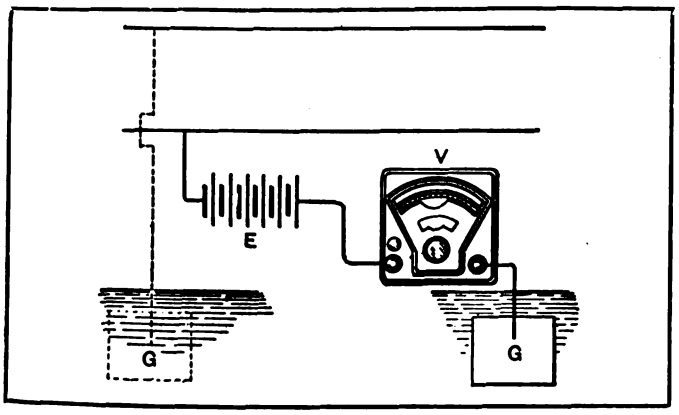

Fig. 5.

and the source of electromotive force which is to be used, remain constant.

To measure the electromotive force, it is common to attach the Voltmeter directly to the poles of the Battery or Generator by means of short pieces of wire. Theoretically the resistance of the leads from the poles of the Battery or Generator to the Voltmeter should be included in the resistance of the Voltmeter; but practically, as these conductors are usually of wire of fair size, their resistance is so small in comparison with the 10,000 ohms or more of the Voltmeter that they cut absolutely no figure. It is easy to see that the range of any Voltmeter can be changed to almost any desired amount by inserting a known resistance in series with the Voltmeter and the electromotive force which is to be used. For example; suppose the Voltmeter to have a resistance of 10,000 ohms and its scale to read 250 divisions. This means that if an electromotive force of 250 volts is applied to the terminals of the voltmeter its needle will be deflected over the entire scale. Now suppose that a resistance of 10,000 ohms be inserted in series with the Voltmeter, the

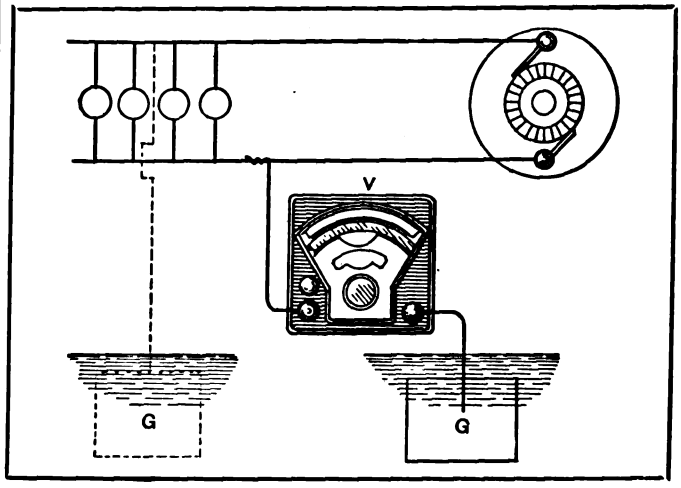

Fig. 4.

Generator giving 250 volts, evidently the total resistance of the circuit has been doubled, and consequently the amount of current which the 250 volts is able to force through the circuit is halved, and the needle will be deflected only 125 divisions instead of 250. This is the principle which underlies all the methods of making resistance measurements by means of a Voltmeter.

In some cases the resistance of the Voltmeter may be unknown, but some other known resistance may be at hand. In such a case the following method is advantageous. Let *E* be

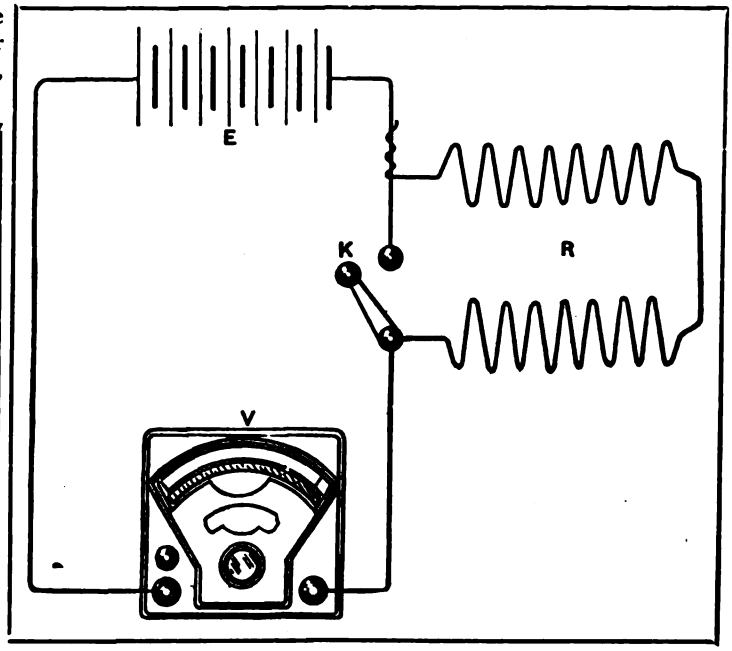

Fig. 6.

the Battery or source of electromotive force which is employed in the test, *V*. the Voltmeter, *r* the known resistance, *R* the unknown resistance which it is desired to measure. Connect the Voltmeter in circuit as shown in Fig. 3 around *r* and take a

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reading, which may be noted by V. Then connect the Voltmeter in exactly the same way around the unknown resistance R and note the reading, which may be denominated by V^1. In this case the fall of potential or drop around each of the resistances, one known and the other unknown, has been measured, and are represented respectively by V and V^1. Now it is evident that the respective drops are directly proportional to the resistances, and hence may be stated as follows: $V : V^1 : : R : r$, and hence $R = \frac{rV}{V^1}$.

If the resistance of the Voltmeter is known, then the use of the known resistance r becomes unnecessary, as the Voltmeter takes its place, and may be inserted directly in the circuit in series with the unknown resistance R. Then the reading V is that found when the Voltmeter is in circuit alone, and V^1 is the reading in series with the unknown resistance R. Then the preceding proportion holds true, remembering that r is under these circumstances the resistance of the Voltmeter itself. This method is frequently used for the measurement of resistances such as are indicated in Figures 4 and 5.

Figure 4 illustrates the method of measuring the insulation resistance of an electric light line, which may be done while the plant is in full operation. The first thing is to connect the Voltmeter across the leads so as to determine exactly the potential of the Generator, then the Voltmeter is connected as shown in the illustration between one lead and the ground and a second reading taken. Evidently the first reading is the potential of the Generator; and evidently in the second test the circuit includes the resistance of the Voltmeter plus the resistance between the ground and the lead; and hence the preceding proportion may be used to determine the insulation resistance, exactly as has been previously shown.

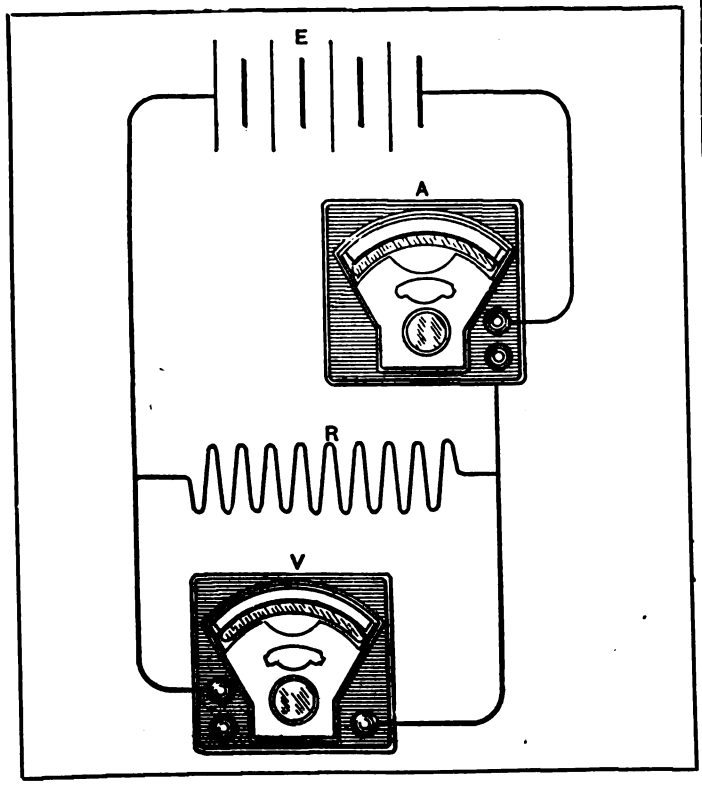

Fig. 7.

Figure 5 shows the method which is very convenient in telephone work, as for example, in measuring the resistance between the cable conductor and the ground. The connections are made as shown in the illustration and two readings made on the Voltmeter, one measuring the potential of the Battery E and the second reading measuring the difference in potential between the line to which the Voltmeter is attached and the ground. Then by setting the three quantities V, V^1 and r in the form of the proportions above given (in which r is the resistance of the Voltmeter) the resistance of the ground is immediately determined.

Another circuit which is sometimes convenient for measuring resistance is shown in Figure 6. In this case, any convenient Battery E is set up in series with the switch K, and the resistance to be measured is placed as shown around K. Now when switch K is closed the resistance R is short circuited and the Voltmeter measures simply the voltage of the Battery E. When the switch K is open R is placed in series with the Voltmeter, and it needs but little consideration to see that this is a similar case to that previously described. Under these circumstances, suppose V to be the Voltmeter reading when switch K is closed and V^1 the Voltmeter reading when switch is open, V^1 of course being less than V, then the resistance R is expressed $R = r\frac{V - V^1}{V^1}$. This formula can be employed advantageously in measuring insulation resistances, as shown in Figures 4 and 5.

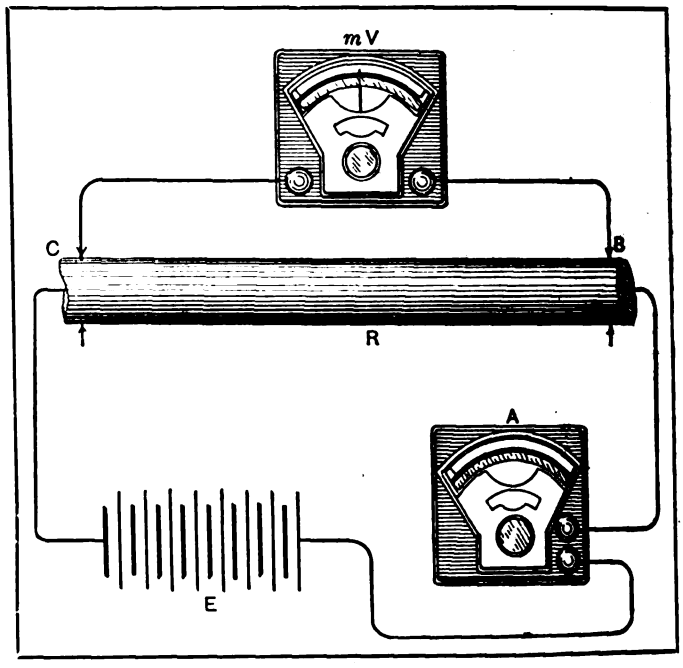

Fig. 8.

It is sometimes very convenient to measure resistances by means of the combination readings of the Voltmeter and Ammeter. For this purpose a convenient circuit is shown in Figure 7. Here E is the source of electricity, A the Ammeter which is wired in series with the Battery E and the resistance R to be measured. The Voltmeter V is placed as shown across the ends of the resistance. Under these circumstances two quantities in Ohm's law are given; that is to say, E gives the fall of potential across the resistance, and C (reading on the Ammeter) is the current that is flowing through the resistance, hence $R = \frac{E}{C}$. This method is exceedingly convenient when it is necessary to measure very small resistances, and when one has a Milli-Voltmeter capable of measuring very small differences of potential. A good plan to be adopted is shown in Figure 8.

The example here given is that showing the resistance of the copper rod R. The source of electricity, E, is attached to one end of the rod, next the Ammeter, A, is placed and lead carried to the other end; then the Milli-Voltmeter is connected between the two points on the rod whose resistance is desired, and the reading of the Ammeter and the Milli-Voltmeter gives two of the quantities in Ohm's law and the resistance may be immediately found as above.

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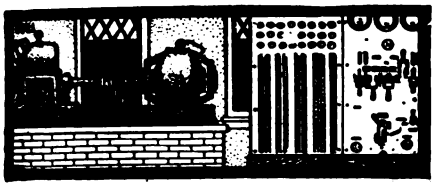
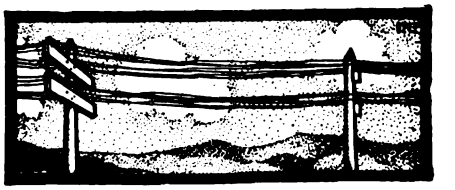


QUERIES

Questions on any subject relating to telephony will be answered on this page.



EXTENSION CIRCUIT.—(456.)

Will you please suggest a circuit for two extension instruments so that all calls can be received at the main instrument but that the extension instruments cannot call the exchange without first notifying the main instrument. G. R.

A circuit which will meet the requirements you outline is illustrated in Fig. 456. The switching key is placed at the main instrument and the signal bell, *a*, is bridged to the main line. By following the circuit through the key it will be seen that the main instrument is normally in circuit. When a call is received for Extension No. 1, the key is so thrown as to move the roller in the direction of *X 1*, opening the circuit of the main instrument and connecting the line to the extension. If for No. 2 Extension, the key is moved in the opposite direction, bridging that instrument on to the main line. Besides this circuit arrangement a call bell circuit should be run to each station to signal them when wanted. Should the key be left in either position besides normal and a call come in, the signal will only be received at the main instrument because the extension instruments have no bells. This circuit is primarily intended for magneto operation.

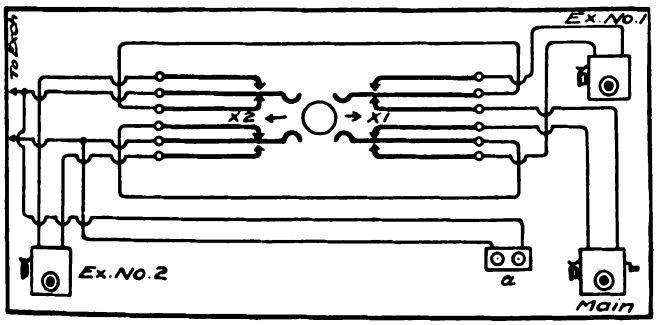


Fig. 456.

BACK BRACE.—(457.)

Can you tell me what a back brace is and what are its uses? N. L. G.

Back braces are put on in addition to the regular ones to offset the strain on the cross arm occasioned by the pull of the lever on curves and corners. Its relation to the regular brace is shown in the drawing, Fig. 457.

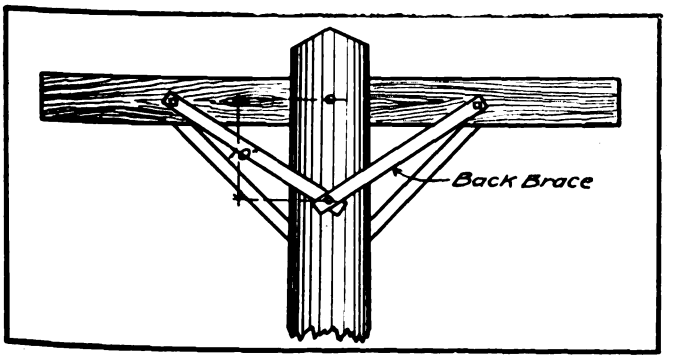


Fig. 457.

CONDENSERS.—(458.)

We have about 400 or more subscribers and common ground return. We use the Stromberg-Carlson S. B. and the condenser, and clearing out drop one bridged one to the other, but in series with the plug and some of the condensers are short circuited. The clearing-out drop being about 350 ohms resistance, which of course will not work when the condenser is short circuited. If I cut the condenser off it increases the cross talk too much. Is there any remedy for it? Can these condensers be fixed or will they have to be replaced with new ones. Please advise. S. McQ.

Whether such repairs as you suggest are or are not practical will depend upon the injury to the condenser. This, of course, it is impossible for us to ascertain here. In many cases it is cheaper to throw the old condensers away and obtain new ones. We believe that the best way for you to do, is to send the damaged condensers to the manufacturers and obtain their advice in the matter. If in any event it is likely that the repairs would require the use of the same originals as used in the manufacture of the condensers, the manufacturers would be in a much better position to make the repairs and do so much more cheaply than anyone else. We believe that the only way to make this circuit work satisfactorily is to see that it is correctly wired with all of the apparatus for which it was originally designed in the perfect condition.

BELL SUBSCRIBER'S CICRCUIT.—(459.)

Will you please illustrate the commony battery line circuit as used by the Bell companies and explain its operation? A. C.

The circuit illustrated in Fig. 459 is the one most commonly used by the Bell companies. As will be seen from the illustration the top side of the line which goes to the top of the jack is normally connected to ground through a spring contact of the cut-off relay, and the line side passes through the line relay to the other spring contact of the cut-off relay to battery. When a subscriber takes his receiver off the hook a shunt is thrown across the line circuit, which causes enough current to flow to operate the line relay. This relay then closes its armature circuit, which permits current to flow from battery through the line lamp to ground, thus illuminating it. When the operator plugs in, battery on the sleeve of her cord flows through the cut-off relay to ground, thereby energizing it and causing its armature to separate the line contacts from battery and ground.

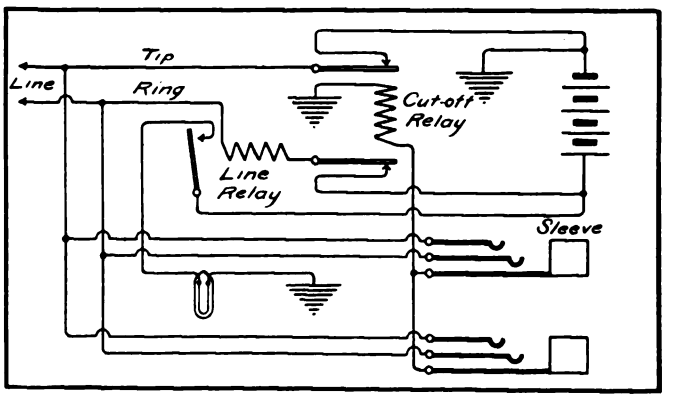


Fig. 458.

The line relay circuit now being opened, the relay is de-energized, allowing its armature to fall back, opening the line signal circuit and thus extinguishing the line lamp.

Battery is supplied to the subscriber's instrument through two windings of a repeating coil over the tip and ring conductors of the cord to the respective springs of the jack.

CELL VOLTAGE.—(460.)

If one battery gives an E. M. F. of 1.5 volts, how can you secure 10 or more volts? Is this possible by taking as many batteries as 10÷1.5 or about 7 batteries? If not, how can it be done? W. H. E.

The only way to secure a greater voltage than is given by the one-cell battery, is the plan which you outlined, namely, by adding successive cells until the required voltage is secured. Inasmuch as there is always some loss in each cell, it is always necessary to add one or two more cells than is shown theoretically by dividing the desired voltage by that of a single cell.

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A POLE AN APPLIANCE, NOT A PLACE.

A CASE at law was recently decided which embodied some points of interest of far-reaching importance and at the same time determined the legal character of a pole. A lineman in the service of a telephone company was injured by the breaking of a decaped telephone pole which he had climbed in the ordinary course of his duty. The pole which fell was decayed below the ground and was apparently sound above the ground. Before climbing it, the lineman tested its strength by shaking and then climbed it some five or six feet and then shaking it. No weakness being thus discovered, he climbed to the top and while engaged in working with the wires the pole fell. The lineman was one of a gang of men engaged in transposing wires for the company from an old line of poles to a line of new poles on the opposite side of the same country road.

The old line of poles was being abandoned because the poles were old and needed replacement, and this the lineman knew. The gang was under the charge of a foreman, but he was not personally present when the lineman was hurt, gave no direction to the lineman about climbing the pole and made no inspection of that or any of the other poles. The lineman sued the telephone company and the court instructed the jury to return a verdict for the defendant.

It was insisted that the instruction to find for the defendant was erroneous because the defendant owed the duty to provide the plaintiff with a safe place to work. The court held, however, that the pole was more of an appliance than a place. It was next urged that it was the duty of the defendant to inspect and test the poles before requiring the plaintiff to climb them. The court considered that the evidence showed that the defendant had "not assumed the duty of having any inspection of the poles before they were climbed by the lineman." Said the court: "The principle applicable in such cases is that by continuing in the service with the knowledge of the manner in which the business is conducted the servant agrees that the dangers obviously incident to the discharge of his duties when he is able to determine for himself the safety of a particular pole before climbing shall constitute a term to a contract of the employment. It was also urged that plaintiff was an inexperienced lineman and that the company knew this and did not instruct him as to the method of testing the pole before climbing and had not furnished him with the tools adapted to making such tests. The court held that the trial judge erred in taking this question from the jury and reversed the judgment.

IMPORTANCE OF DETAILS IN RURAL CONSTRUCTION.

IN the previous issue of the JOURNAL we started a series of articles upon Rural Line Construction, which we believe will go a long way toward solving a problem which is, quite often, a sticker to the man who has this work in view. To merely put up poles and string wire is a comparatively simple matter, but to do the work in the right way and to lay out a system which, while covering a territory in a thorough manner, yet does so with economy, requires a good knowledge of the principles which underlie telephone engineering. Many a rural line has been put up where only a short while afterwards defects in its construction and operation have begun to crop up, which have necessitated an expenditure to remedy that, added to the original cost, far exceeds the amount which would have been required at the outset had a thorough investigation of the requirements of construction been undertaken. A chain is no stronger than its weakest link, and similarly a telephone system whic hhas one defect is made no better by the excellence of the rest of its construction.

SOME REMARKS ABOUT COUNTRY LINES.

The question of the construction of pole lines is one which, too frequently, meets too little consideration. Poles which are not capable of holding more than a pair of wires are employed, and when it is necessary to add more circuits, poles are overloaded and at the first hard blow or sleet storm they go down. Again, the correct spacing of poles often causes trouble which necessitates a large expenditure for replacement.

Service distribution is another feature of line construction which, if not carefully handled, will frequently bring disrepute upon a system which otherwise has been constructed upon the right principles.

These are but a few illustrations of the desirability of a thorough insight into the construction of a proper rural system, and while the pitfalls for the unwary manager are many, these will serve their purpose in drawing attention to the oft-repeated fact that work is not worth doing unless done well.

TRANSACTIONS OF THE INTERNATIONAL ELECTRICAL CONGRESS.

WE are informed that the transactions of the International Electrical Congress are now being prepared for the press and will contain 153 specially invited papers, together with the discussions thereon at St. Louis, and a report of the proceedings of the Chamber of Delegates. They will form three large octavo volumes, each of which will contain about 900 pages, and a frontispiece engraving, two frontispieces being group photographic views and a third a view of the Electricity Building at the Exposition. The membership roll of the Congress closed on the last day of the meeting, September 17, but anyone desiring to obtain a copy of the Transactions can do so by subscription. Subscriptions will be received until December 1. The subscription price is $10.00, which includes the cost of delivery to the subscriber. As it is not intended to print a reserve stock, and only those for the Congress membership, or on order, are being at present printed, orders should be sent in promptly to the treasurer, Mr. W. D. Weaver, 114 Liberty street, New York City. The volumes will constitute a valuable landmark in the literature of electrical science and engineering.

REGULATION MUST BE GENERAL.

HEARING has been had at St. Paul, Minn., on the application of the Twin City Telephone Company for an injunction restraining the city from interfering with the poles and wires of the company on Hague avenue. The company tried to show that the resolution of the council, ordering the removal of the poles was unreasonable, because sufficient time was not allowed in which to do the work. The company also contended that the resolution was invalid on the ground that it discriminated against the Twin City Company, and took the position that the council had no authority to pass regulations for the telegraph and telephone lines, unless such regulations applied to all lines within the same territory. The city, on the other hand, contended that plenty of time had been given the company to remove these poles, and that a representative of the company was present at the council when the resolution was adopted and made no objection to it. The court took the matter under advisement.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

CONVERSION OF WIRES.

The wires of an electric light company were attached to our poles without permission or authority from us. The Board of Electrical Control of the city ordered us to remove all our wires from the poles and we did so, cutting away both our wires and those belonging to the electric lighting company. The electrical lighting company is now suing us for converting their wires and we deny all liability. We gave no orders as to what should be done with the wires and have not got them in our possession. The other company claims that our linemen took them away, but if they did so it was without any orders whatever from us and we have never had anything to do with the wires. Please cite such cases as show we are not liable. A. K. Telephone Company.

WE cannot cite any such authorities as you request, because it seems to us that you are liable for the conversion of the wires, because the act of conversion was so closely and intimately related to and connected with the employment of your linemen that you would be held responsible for their acts. See Electrical Power Company vs. Metropolitan Telephone & Telegraph Company, 148 N. Y. 746, 43 N. E. 986.

REMOVAL OF WIRES.

A few of our wires are strung across a certain street, being attached to poles erected on private land and suspended 30 feet above the street so that they do not interfere in any manner with the use of the street. Can the city council order us to take the wires down, there being no good reason for doing so? Capital Telephone Company.

IT has been held in a case somewhat like yours that the authorities had no right to remove wires which did not interfere with the use of the streets. We could answer your question better if you would make a fuller statement of the facts. See American Un. Telegraph Company vs. Harrison, 31 N. J. Eq. 627, 1 Am. El. Cases, 291.

BREAKING OF POLES.

A heavy wind storm snapped off one of our poles. It fell on a barn and the timbers breaking fell on a horse inside the barn and killed him. The owner is making a claim for damages against our company. Should we settle with him? V. Telephone Company. (Kan.)

THE question of whether you should settle with him is one merely of policy, as there is no liability whatever upon your company. Although a telephone company is bound to exercise reasonable care in the construction and maintenance of its lines, yet it is not an insurer of the absolute safety of its poles. It is not required to erect and maintain poles so strong that no storm can break them, but only to erect and maintain poles of sufficient strength and in such manner as to withstand such violent storms as may reasonably be expected. Ward vs. Atlantic Teleg. Company, 71 N. Y. 81, 1 Am. Elec. Cases, 259; 27 Am. Report 10. Under this state of the law you seem to have a good defence, and unless you can make a very cheap settlement we do not advise one.

LOCATION OF SUBWAYS.

Is the action of the Board of Public Works in locating a subway conclusive, where it appears that the location indicated by it is not the best for all parties? G. N. T.

IT was held in a New York case that the action of the Commissioner of Public Works was not conclusive under a state of facts as follows: The location designated by the commissioner was directly over another subway, and if so constructed it would interfere with access thereto, but there was ample room for a proper construction of the subway on either side of the existing one. The franchise of the earlier company was granted in consideration of the use by the city of one of the ducts in said subway for the city wires. The court held that the action of the commissioner was not conclusive and granted an injunction restraining the construction as prescribed by him. In the absence of a possible interference with the subways of other companies, or a similar situation, the determination of the board of public works would be conclusive. Western Union Teleg. Company vs. Syracuse. 53 N. Y. S. 690.

EMINENT DOMAIN IN PENNSYLVANIA.

THE laws of Pennsylvania provide by clause 1, section 33, of the Act of April 29, 1874, P. L. 92, that the telegraph company should have authority "to construct lines of telegraph along and upon any of the public roads, streets, lands or highways, or across any of the waters within the limits of this State." In a recent case a question arose whether a telephone company in that State possessed the right of eminent domain, it being considered that the telephone company did not possess the right unless it was possessed by the telegraph company. The telephone company contended that the statute quoted should be construed to read as if the qualifying word "public" applies to the words "streets, roads and highways"; but not to the word "lands." The court held that this situation was not reasonable and would not uphold it. It was also contended that a denial of the right of the appellant to enter upon private lands would defeat the grant of the franchise to construct and maintain a telephone line, and that, as the right arose from absolute necessity, the legislature intended to confer it.

The court said upon this point that the telephone lines were generally constructed in the public streets, and when they were built upon public lands it was for the advantage of the company and not because the efficiency of its service would be diminished by keeping on public roads. Said the court: "That the appellant must try to persuade us that we ought, by reading the act with it, discover that it possesses the right to take private property, instead of being able to at once point directly to the words clearly conferring such right, is conclusive that the same does not exist. There must be no effort to prove the existence of such high corporate right, else it is in doubt, and if so, the State has not granted it." The court distinguished the present case by the recent one of Woods vs. Greensboro Gas Company, 204 Penn. 606, 54 Atl., 470, saying: "All that was said was that if the exigencies of the business of the gas company should require the use of a telephone line, the company could obtain authority to construct one by securing in its interest a charter for that purpose, but such line could be constructed and maintained only within the corporate powers and privileges of the telephone company." Penn. Teleph. Company vs. Hoover, 58 Atl. 922.

INJUNCTION AGAINST RAILROAD COMMISSION.

THE attorneys for the Cumberland Telephone and Telegraph Company, at New Orleans, La., have consented to take no action in the matter of the injunction suit recently filed against the Railroad Commission of Louisiana, in which it is sought to restrain the commission from putting into effect orders which seek to protect special contracts claimed by subscribers to the company's service in various parts of the State until the commission's rights in the premises can be thoroughly investigated by the Attorney General. The exchanges to be affected by the proposed new orders are at Donaldsonville, Napoleonville, Thibodaux, Morgan City, Patterson, Whitecastle, Plaquemine and Bayou Sara or St. Francisville. The service which these parties are now enjoying will, therefore, be continued under the present plan until the investigation by the Attorney General shall have been made.

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IN THE OPERATING FIELD.

A NEW WESTERN PENNSYLVANIA COMPANY.

THE construction of the new line by the Bruceton and Fairchance Telephone Company will add another link to the extension telephone system of Western Pennsylvania and Virginia. This line will run from Bruceton, in West Virginia, to Fairchance, in Pennsylvania, and will connect with the system of the Tri-State Company.

The new company will operate under an option secured from the Tri-State Telephone Company of Uniontown, which gives it the right to build the line and operate it conjunctively with the latter company, although the right to purchase the line by the Tri-State Telephone Company is reserved, if at any future time it desires to acquire it for the cost of construction. About 2,000 telephones will be added to the field of the local service and a new route will also be afforded to Cumberland.

A number of well-known Uniontown men are interested in the new company. J. H. Walls, of Rockville, W. Va., is the president; George B. Irwin, of Fairchance, vice-president; James Dougherty, F. M. Beeson, Fairchance, and C. C. Frankhouser, W. J. Bowermaster, William M. Wolf and Perry Metheny, of West Virginia, directors.

IMPROVEMENTS TO PLANT OF HOME COMPANY OF SOUTH BEND, IND.

THE South Bend Home Telephone Company recently completed the installation of 56,720 feet of aerial cable to relieve congested lines as a result of the building up of several new additions in the outlying districts this season and the heavy demand for telephone service in various parts of the city. The company also installed 20,000 of underground cable to give service in several down-town districts where there were more subscribers than cable capacity, and also to connect the aerial cable with the exchange.

The company has experienced a wonderful growth during this season and will issue a new directory on January 1 that will list 3,500 subscribers in St. Joseph County.

Elaborate preparations are being made for the annual reception which will be held on Saturday, December 31, owing to the fact that the New Year comes on Sunday. The exchange will be opened for public inspection from 9 in the morning until 9 at night to allow the people of St. Joseph County to make a thorough examination of a modern telephone plant.

HOME COMPANY OF SAN DIEGO NEARLY DOUBLES EXPENDITURE REQUIRED BY FRANCHISE.

FROM a report recently issued by Secretary Godfrey, of the Home Telephone Company of San Diego, California, it is learned that the Home company has spent $52,398.88 as against $30,000 which it guaranteed to spend when granted its franchise. This expenditure is divided as follows: For labor $15,534.84, and material $36,864.04.

According to the franchise $30,000 was to be spent in the second period of the grant which was from the eighth to the twelfth month.

THE ERIE TO BUILD A LONG DISTANCE SYSTEM.

THE Erie Railroad Company will spend about $125,000 in the construction of a long distance telephone line from Cleveland to Jersey City. The poles already in use for the telegraph system will be utilized, thus reducing the cost considerably. At present the Erie has a private telephone system in use between Cleveland and Galion, Ohio, with connections at Leavittsburg, Kent, Akron, and Mansfield. The policy of the large trunk lines in utilizing their right of way for the construction of private telephone systems makes possible a great saving in the cost of construction. At present, besides the Erie railroad, the Lake Shore, New York Central, Delaware Lackawanna and Western, New York, New Haven and Hartford, Pennsylvania, Illinois Central and the Burlington railroads have either long distance systems constructed or else contemplated and in almost all instances these railroads operate local systems at various points along their lines.

THE OTTUMWA TELEPHONE COMPANY REORGANIZED.

THE Ottumwa, Iowa, Telephone Company has recently been reorganized under the title of the Ottumwa Telephone and Electric Company with S. W. Crosby, of Ashtabula, Ohio, president, and H. W. Stecher, of Cleveland, secretary.

Howard Herr will be retained as manager, and will have full charge of the company's interests in this city. Under Mr. Herr's direction the business of the company in this city has continuously grown from a small beginning until now it has nearly 1,400 telephones in the city and 700 in the country immediately surrounding Ottumwa. These, with the connections that can be reached through the exchanges in the smaller towns, Mr. Herr states, gives the subscriber access to about 15,000 telephones in Wapello and adjoining counties. In addition to these arrangements, the line has been entirely rebuilt under Mr. Herr's management. He is an incessant worker and has been the largest factor in bringing the business to its present standing.

In speaking of the new organization, one of the officers said: "The business is now in splendid shape, the details of the transfer have all been finished, and we are now going to still further increase the facilities of the plant and give the best service possible."

NEW PLANT OF PITTSBURGH AND ALLEGHANY TELEPHONE COMPANY.

FOLLOWING out its aggressive policy which has been its best asset since it started, the Pittsburgh and Alleghany Telephone Company has arranged to enlarge its scope of operations by the erection of an exchange building in Knoxville, a suburb of Pittsburg, which will be equal to any similar structure in western Pennsylvania. Last week the company's architects, McClure and Spahr, awarded the contract for the building which will cost at least $20,000. It will stand at the corner of Orchard street and Georgia avenue, a point that commands a magnificent view of nearly the entire city. The excavations have already been started and the building will be finished in about 90 days.

In its design and arrangement the Knoxville exchange building will be very similar to the one recently completed by the P. and A. company in McKeesport. The part to be erected now will be 35 x 75 feet in dimensions. To provide room for future growth the company has wisely bought 40 feet in the rear of this on which the new building can be extended at any time desired. The building will have walls of pressed brick with white terra cotta trimmings and will be strictly fireproof. A well finished basement will extend under the whole structure. The architects have adopted a special design for the building to imitate by appearance the purpose for which it was intended.

The exchange is intended primarily for long distance service,

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22 positions being provided on the long distance switchboard. In addition to the long distance switchboard space is also allotted for a 3,000 line multiple common battery switchboard for serving the P. and A. patrons in the territory immediately surrounding the office. It is proposed to equip this office in the most modern manner for handling both long distance telephone and telegraph service. All calls from points west of Pittsburgh and those destined to points east of Pittsburgh will be switched through this office over lines which skirt around Pittsburgh. In fact all the long distance service will be kept out of the city lines entirely except when a call is made for a subscriber in the city when the connection will be put up over special long distance trunks. When this exchange is in full operation it will not only greatly relieve the present strain on the P. and A. service due to its marvelously rapid growth but will afford to Pittsburghers and their outside friends by far the best means of long distance communication that they have ever enjoyed.

The interior of the exchange building will surpass any similar building in the city. The offices will be handsomely finished in hard wood and will have tile vestibules. Special provision has been made for the comfort and health of the operators. Dainty lunch rooms, a retiring room and a large reading room will be supplied. The latest and most improved system of heating and ventilation is to be installed and the lighting will be secured by an adequate distribution of skylights and windows.

NEW IOWA CORPORATION.

THE Blakeville Farmers' Mutual Telephone Company, of Dunkerton, Black Hawk County, Iowa, has been incorporated with a capital stock of $5,000. Board of Directors: Albert Holdiman, Ed. Liebert and Herman Katz. Officers: President, C. W. Smith, vice-president, Martin Rinderknecht; secretary, William Rodgers; treasurer, Sidney Weick.

SELECTIVE SYSTEM FOR HOME COMPANY OF OWENSBORO, KY.

THE Home Telephone Company, of Owensboro, Kentucky, will introduce four party selective signaling to its system in the near future. This company has made a number of improvements in the past and under the able management of H. K. Cole has developed a system that will bear comparison with any in the country. Extensive construction of the aerial plant has been under way all the summer.

THE LIFE WORK OF JUDGE THOMAS

JUDGE JAMES M. THOMAS, whose death was announced in THE AMERICAN TELEPHONE JOURNAL last week, was in many respects the most conspicuous figure in the Independent telephone movement. He was an indefatigable worker and almost from the date of his birth in 1858 he was demonstrating to his friends and relatives an ability to achieve results in excess of that quality in the average man. His early life was spent on a farm in Ross County, Ohio, where the elements of his education were received. After a course of study at The Ohio Wesleyean University at Delaware, Ohio, he took up the calling of teaching and held the position as school master for quite some time. Looking round for a better opportunity by which to use his talents, he took up the study of law and shortly afterwards engaged in practice at Chillicothe, Ohio. Honors soon came to the young lawyer, the nomination for probate judge of Ross County being offered to him. To this office he was elected by a large majority, and so well did he carry out the duties of the Court that he was re-elected for a second time. About this time The Home Telephone Company, of Chillicothe, was organized, and Judge Thomas became a stockholder, shortly afterwards being elected president.

The Late Judge Thomas.

His identification with the Independent movement dated from that time, and when the Independent Telephone Association of the United States was organized at Detroit in 1897, Judge Thomas was elected president, which office he held for six successive terms, till 1903. In an address which he made before the National Convention at Chicage on June 24, 1903, he summed up the desires of everyone associated with this enterprise in his final remarks, saying: "What we all want, and what everyone should work to accomplish, is to bring the business up to a commercial level with other public utilities, so that the investor will feel that with greater development comes the more stable investment."

Recent evidence tends to prove the truth of this statement. In another part of this same address, Judge Thomas drew the attention of the Independent operator to the remarkable development made in this particular field. Saying in part:

"Our right having been established, we find as a proof that we were right in our contention, the fact that the investors in this country have placed in use more telephones than are operated by the Bell Telephone Company." That statement was made but a little over a year ago, and yet to-day the insignia of Independent telephony is found in almost every hamlet of this country.

Among the many patent suits which Judge Thomas fought against the Bell, none were of more importance than those relative to the famous Berliner patents which he successfully contested.

Besides holding the office of president of the National Association, Judge Thomas took charge of the United States Telephone Company as general manager in 1899, and later became president of the Telephone, Telegraph and Cable Company of America, which was formed to install an Independent telephone system in New York City. As president and general manager he made a gallant fight to put the company into service, but he did not receive proper support and finally withdrew from the company. The matter of an Independent system was allowed to drop. Shortly afterwards Judge Thomas entered the insurance business in New York City and took up his residence at Irvington-on-the-Hudson, where he was living at the time of his last illness, which ended so unfortunately

If for no other reason, Judge Thomas will always be remembered by his associates and colleagues as a man who believed that he was right, and who in believing fought hard for the purpose in view. To those who knew him personally his loss will be a great blow. He was one of those rare combinations in the business world, a man who could combine lovable traits of character with an earnest endeavor to act squarely with the world at large.

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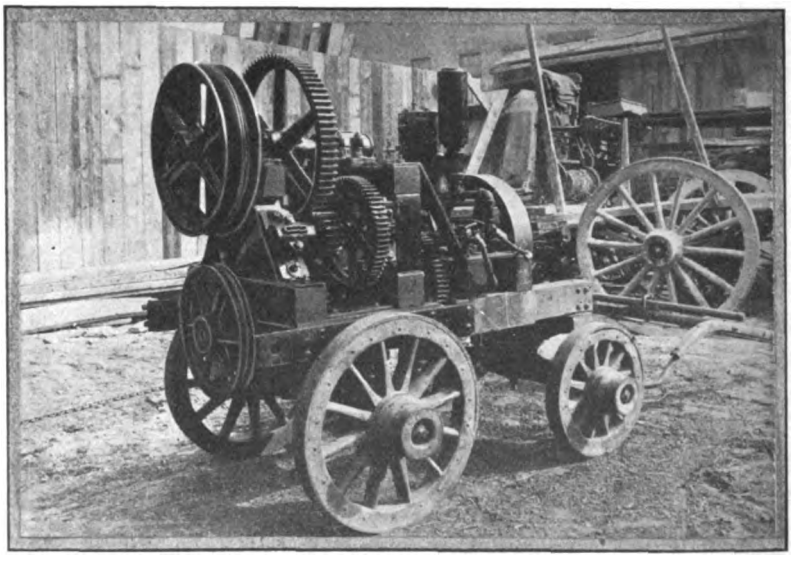
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

THE GUNNELL CABLE HAULING ENGINE.

A DEVICE which has attracted widespread attention whenever used is at present being employed by the Lewiston Auburn Telephone Company, at Lewiston, Me., to draw in the underground cables. This machine, a photograph of which is herewith presented, bids fair to revolutionize methods to install cable whether underground or aerial. By its use it is possible to draw in 5,000 feet of cable daily, a task which formerly required the services of nine men for three days to accomplish. It essentially consists of a specially constructed wagon on which is mounted a gasoline engine of seven horse power. By means of friction clutches and gearing this engine drives a winding drum which pulls the cable. Its weight is about two tons, but this is so distributed over the carriage as to not interfere in the least with its mobility.



Gunnell Cable Hauling Engine.

This device is known as the Gunnell cable hauling machine and is employed by the Knickerbocker Construction Company of New York, which has charge of cable work under the supervision of Mr. E. B. Baker, the company's superintendent.

Besides this unique contribution to the field of telephone engineering Mr. Gunnell has devised a shoe which when put in position precludes all possibility of kinking a cable when it is drawn out. Heretofore when cable has been taken out by hand quite frequently the damage by kinking has been such as to render large sections useless for further operation, but by means of this shoe this unnecessary damage has been made impossible so that a cable can be used indefinitely without any danger of its being damaged in installing.

THE FRANKEL DISPLAY FIXTURE COMPANY, 718 Broadway, New York City, was granted a patent on its wire testing clip on November 15, 1904. This clip, which was illustrated and described in this department of a recent issue, is used for making test or temporary connections. It is used extensively by many of the largest telephone companies, and seems destined to soon become universally used.

THE BAIRD MANUFACTURING CO., 4 Michigan street, Chicago, has just received an order for 200 pay-stations from an old customer. This instance only bears out the statement that "once a Baird pay-station user, always a Baird pay-station user." Their catalogue and net price list will be sent to anyone interested in pay-stations and measured service equipment.

THE AMERICAN ELECTRIC TELEPHONE COMPANY, of Chicago, reports among other recent shipments, switchboard equipments sent to the following points: Hinton, W. Va., 25-line switchboard; Haviland, Kans., 100-line switchboard; Rock Valley, Iowa, 200-line switchboard; Grayson, Mo., 50-line switchboard; Auburn, Iowa, 100-line switchboard; Lenox, Iowa, 100-line switchboard.

"AN ANALOGY IN GAS."

UNDER this title THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Block, Chicago, Ill., has brought out an interesting booklet, which is somewhat of a novelty in telephone literature. The point is, of course, measured telephone service. The booklet draws a comparison between a gas plant run on an unlimited service basis under which the owner lost money, and his "subscribers" had poor gas, and on a measured service basis under which he made money and his subscribers had good gas and were consequently very happy thereafter.

The story of the gas man as told in the booklet is as follows: He put in a plant large enough to give light to 500 families, with an average of six lights to each family. Charges were based on the assumption that one or two of the six jets would be used at a time. The charge being the same to the consumer whether one or none or six jets were used, needless to say the customers kept them all going full blaze. This reduced the pressure, and complaints of the poor quality of gas were rife.

The gas man then did some reasoning. He discovered he was giving each consumer about three times the amount of gas he had figured on. He recalled that grocers do not ask you to pay one, two or three dollars per so often for the privilege of lugging away all the sugar or coffee or salt you can carry, but weigh it; in other words, measure it. Why not then measure gas? He did. He got more customers and more money from each customer.

THE CONTROLLER COMPANY OF AMERICA, 1061 Monadnock Block, Chicago, entertained the representatives of a number of the World's Fair electrical exhibiting firms on a trolley-car ride, November 10. A fast ride was given them over one of the suburban lines west of St. Louis. Mr. A. H. Stroud was in charge of the private car Mabel, owned by Mr. E. G. Lewis, secretary of the Controller Company.

THE INTERNATIONAL TELEPHONE MANUFACTURING CO., Chicago, it is said, has devised a system which enables it to build its regular self-restoring drop magneto switchboard in such a manner that the system may be used originally as a generator-call local battery plant and changed at any time into a strictly central energy system by simply adding the necessary central office battery or power plant.

Changing from generator-call to central energy does not require discarding any part of the central office apparatus. This enables telephone companies, when rebuilding small generator-

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—A good man for instrument work, who can also run wiring for electric lights. Address Box 287, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 287

WANTED—First-class wire chief; magneto and central energy. Must fully understand installing multiple switchboards, etc. Address Box 288, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 288

TO ring upon rural subscribers' lines no matter how many receivers are off the hook. Ten cents for diagram. C. BUNDESMAN, Shelbyville, Ind. 289

WANTED—Position with telephone company. I am an expert lineman and repair man; three years' experience; best of references furnished. Address P. O. Box 591, Toledo, Tama County, Iowa. 278

WANTED—Position as manager or superintendent of Independent exchange. Am temperate, married, and have had four years' practical experience. Address Box 273, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 273

WANTED—To secure engagement with some telephone company on or after March 1, 1905, as wire chief assistant or superintendent of inside installation, as well as switchboard duties. Ten years' experience. Address Box 284, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 284

WANTED—Position as superintendent of a large exchange or manager of a plant, 1,000 telephones or less. Have had ten years' experience in all branches of the business. At present am superintendent of an exchange in a city of 175,000 population. Open January 1st to any company that wants a hustler. Address Box 286, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 285

WANTED—Position as manager with a first-class company looking for a hustler. Experienced particularly in toll and long distance work, including clearing house methods, and line construction. Familiar with every detail of telephone work. Executive ability; excellent references. Address Box 285, care THE AMERICAN TELEPHONE JOURNAL, N. Y.

SITUATION WANTED—Experienced cable man wants position. Understands underground construction, pulling cable and splicing or position in engineer's office; South or West preferred. Has been with present company three years. Desires change for increased experience. Address Box 280, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 280

WANTED—Position as manager. At present has charge of four exchanges, common battery and magneto. Has had factory experience, building and installing complete equipment. Understands handling of men and laying out complete installations. Have rebuilt exchanges and put them on paying bases. Will be open January 1st. Address Box 277, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York

Reliability and Clear Transmission of Signals

are features of the

Baird Pay-Stations

which appeal to both subscriber and operator.

Their phenomenal earning power and **low maintenance cost** appeal to the stockholder in every telephone company where they are installed.

$80.00 in 6 weeks put into one Pay-station in Chicago.

Our catalogue and net price list sent free if you want them.

Baird Manufacturing Company

4 Michigan St., Chicago, Ill.

At least a carload of

TELEPHONE SUPPLIES

leaves our factory every day. Some days more than a carload; maybe two, or three. This gives an idea of the volume of our business. The reasons:

OUR SUPPLIES ARE THE BEST
OUR PRICES THE LOWEST
OUR DELIVERIES THE PROMPTEST

We make all line supplies in our own factory by machinery. We buy the rough material in quantities, securing special discount. We ship all orders direct from stock. Write us your specifications and see what we can do or you

HUBBARD & CO.

Murtland Building **Pittsburgh, Pa.**

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call plants, to first put in the necessary switchboard and later, at any time, install the power plant and make the necessary changes in the telephones and ultimately have a complete central energy system.

A NOVEL WALL BRACKET PIN.

THE wire chief is constantly encountering a problem in the endeavor to run drop wires from the subscriber's premises to the nearest pole line. In the past all sorts of devices have been offered to provide attachments for the insulators so that they may be secured to high walls. Where buildings are of wood, this is not a difficult matter, but in the case of brick and stone it is almost impossible to make a neat and

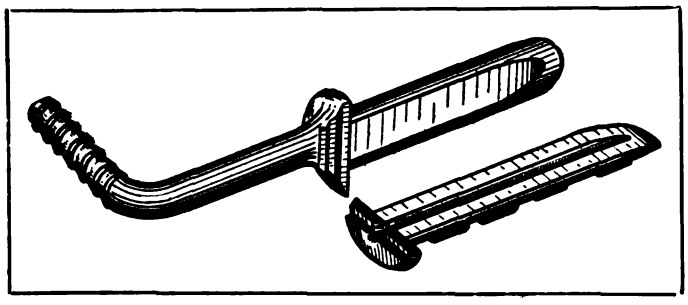

Fig. 2. Parts of Expansion Bracket Pin.

sightly job, and one which is with all sufficiently strong to be permanent.

The Star Expansion Bolt Company, 149 Cedar street, New York, have recently placed a device upon the market which will be greatly appreciated by the wire chief and is illustrated in Figs. 1 and 2. Fig. 1 is a sectional view from which it appears that an l-shaped expansion bolt is provided which is secured by drilling a hole into the masonry of the building wall and inserting therein the shank of the bolt. This is secured in place by driving. The shank is split in two parts which are wedge shaped with reference to each other, as is indicated both in Figs. 1 and 2. The shank carries a collar which bears against the side of the wall, and on the under side of this collar is corrugated. The wedged portion has similar indentations, and consequently when the wedge is driven into the hole in the masonry, it secures the shank firmly in position and the corrugation on the wedge automatically locks it into position by falling into corresponding corrugations in the shank. The insulator may be of any improved type and is secured to the bolt by means of a threaded wooden plug cut so that the interior thread secures the plug upon the bolt while the exterior thread forms an attachment for the insulator. By this means opportunity for expansion is provided so that the insulator is not exposed to the danger of splitting due to changes of temperature.

MR A. B. KRATZ, formerly Cleveland representative of the Kellogg Switchboard & Supply Company, has accepted a position as traveling salesman with the North Electric Company, of Cleveland.

THE SUMTER TELEPHONE MANUFACTURING COMPANY, manufacturers of telephones, switchboards and telephone appliances, with factory and general offices at Sumter, South Carolina, reports that it is enjoying a splendid business. The company is now increasing its capacity about 100 per cent. by the addition of more buildings, machinery, etc.

NEW MANUFACTURING COMPANY INCORPORATED.

PAPERS incorporating the L. M. Ericsson Telephone Manufacturing Co., under the laws of the State of New York have been filed in the office of the County Clerk of Erie County, N. Y.

The capital stock of the company is to be $200,000, divided into 2,000 shares of $100 each. The incorporators and directors for the first three years are Axel Bostroem, of Stockholm, Sweden; Fenton M. Parke, a real estate man of Buffalo, N. Y., and Attorney Carl H. Smith, whose offices are in Ellicott Square, Buffalo. Another man who is active in the organization of the company is Klas Weman, of New York City.

The papers state that the principal offices will be in the town of Tonawanda, Erie County, New York. Tonawanda is a suburb of the city of Buffalo.

According to the Buffalo *News*, the company intends to build a plant for the manufacture of telephone transmitters, receivers and other telephone apparatus under the Ericsson Company's patents. This company's main plant is in Stockholm, Sweden.

FRANK B. COOK, West Lake street, Chicago, has been making several additions to his line, and is now carrying a full line of construction material, on which he is quoting some attractive prices. He is getting up a new catalogue, which will include, among other things, Marlin cable hangers, anchors, messenger

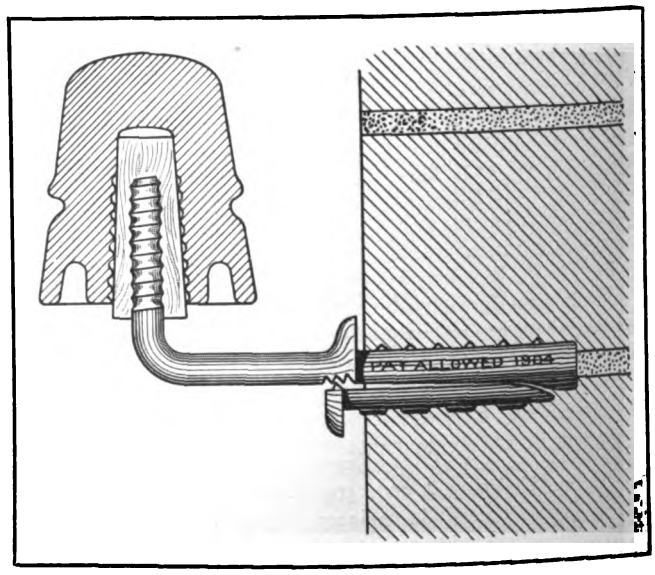

Fig. 1. Section of Expansion Bracket Pin.

hangers, pole steps, insulators, cross arm braces, insulator brackets, brackets, and wooden pins. Cook's name is so well known that it is a guarantee of the quality of the material that will be furnished on orders sent him. A great many companies appreciate the desirability of ordering all their supplies through one house, and will unquestionably take advantage of the opportunity Cook offers.

The sale of Cook's 444 protector still goes merrily on. The principal feature of this protector is the self-soldering, self-restoring,

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"Style A."
(Exact Size.)

For Twin or Parallel Wires.
Price $4.30 per 1000.

Style "B."
(Exact Size.)

For Twisted Pairs.
Price $4.50 per 1000.

Style "C."
(Exact Size)

For Corners.
Price $4.00 per 1000.

"Style D."
(Exact Size.)

For Three Wires
Price $6.50 per 1000.

A Cleat that will not break or split. It requires half as much time to install as any other. It is also smaller and neater. Have you seen

The Morris Hard Fibre Cleats?

Hundreds of Companies are using them—will not use any other. They save time and money. First cost is less than others, and there is no maintenance cost. Made in sizes and shapes as pictured, and in three colors, red, gray and black.

We will send red unless otherwise specified.

Let us send you Free Samples.

THE MORRIS ELECTRIC CO.,

Manufacturers of Fibre for Electrical Purposes.

FOURTH AND SHIPLEY STS., WILMINGTON, DEL.

You Will Find It Pays To Test

your lines periodically for insulation and resistance This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone. work and are low in price.

LOUIS M. PIGNOLET

Originator of the Voltmeter Habit. **78 CORTLANDT ST., NEW YORK**

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TRADE MARK.

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"TELEPHONE TROUBLES AND HOW TO FIND THEM"

By W. H. HYDE and J. A. McMANMAN.

This Little Book is Strictly up-to-date on all Matters Pertaining to Telephone Troubles and their Remedies on both Magneto and Common Battery Systems.

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SEND IN YOUR ORDER.

AMERICAN TELEPHONE JOURNAL, 116 Nassau St., New York

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self-contained heat coil, and it appears to be a very satisfactory feature. The Home Telephone Co., of Los Angeles, Cal., has just put in a great many pairs of the No. 444 protector—1,300 in the East Exchange, 600 in Highland Avenue Exchange, 1,020 in Boyles' Heights Exchange, 600 in Central Avenue Exchange, and 200 in Prospect Park Exchange. The Lake Shore Telephone Co. has put in 100 pairs at their Pentwater (Mich.) Exchange. The Union Telephone Co., of Girard, Pa., have ordered a Cook's Type L board, with 100 pair of No. 444. Other orders recently received are as follows: Home Telephone and Telegraph Co., Riverside, Cal., 1,000 pairs; Lynn Local Telephone Co., Lynn, Ind., 260 pairs; the Illinois Telephone Con. Co., Chicago, a 300 pair addition; Brooklyn Tel. Assn., Brooklyn, Iowa, type L 3-frame, with 70 pairs mounted; People's Telephone Co., Chillicothe, Ill., 400 pairs; Hawkeye Telephone Co., Winterset, Iowa, 360 pairs.

A NEW CABLE HANGER.

THE firm of W. H. Anderson & Sons, Detroit, Michigan, have just placed upon the market a decidedly improved cable messenger hanger, cuts of which are shown below, Fig. 1 representing the hanger as it holds the strand clamped under strain. Fig. 2 shows the hanger before or after clamping, with cap plate turned backward for reception or removal of the messenger strand.

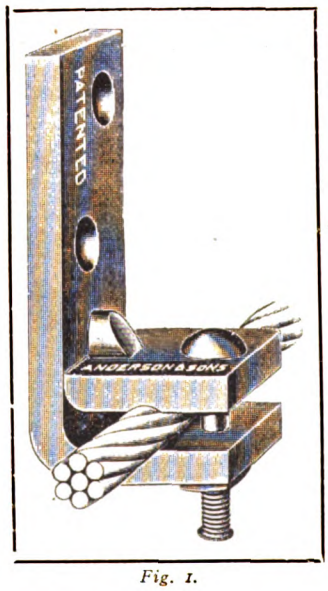

Fig. 1.

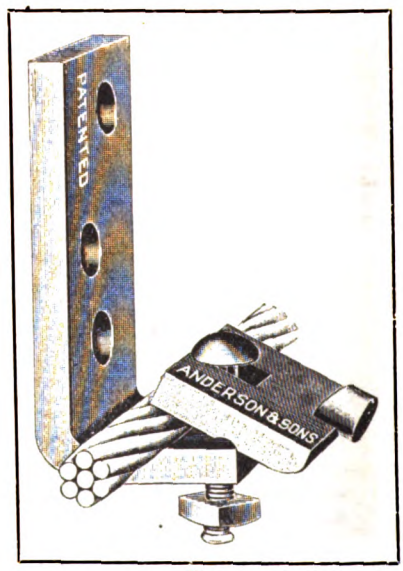

Fig. 2.

The strong points of advantage in this device over the old form of brackets are accessibility, greater tensile strength with less weight of material, lack of the necessity for more than one bolt, and no chance to lost parts, as the nut cannot come off. The cable is nearer to the pole, due to fact that the second bolt is not present.

To unlock the clamp all that is required is to slacken the one nut and slip back the clamp plate until the extension is disengaged from the "L" or frame of the bracket, then the clamp may be thrown into position No. 2 for removal of the strand.

The idea of the whole thing being inseparable must commend it highly to people who are buying construction material of this nature. The matter of messenger hangers is a detail of construction work, but it is the small things that in the aggregate may make or defeat the success of the plant.

You may string a good cable in such a way as to have at the end of a short period a lot of junk. It is analogous to the man building a house on the sand. Don't do it, especially when it costs no more to do it right.

The device shown is the invention of H. D. Stroud, and can be supplied either by W. H. Anderson & Sons, Detroit, Michigan, or the Controller Company of America, 1061 Monadnock Block, Chicago. Samples and prices will gladly be sent to responsible companies or constructors, and the manufacturers will be only too willing to give any further information desired.

THE CONNECTICUT TELEPHONE AND ELECTRIC CO., INC., of Meriden, Conn., report large sales on their low-price toll line switchboards for country lines. These boards are equipped with the highest grade working parts throughout. The hustling efforts of this concern is appreciated by the trade, who desire thoroughly well manufactured articles. The company is now distributing their large No. 8 catalogue describing its many new and up-to-date features, which will be sent upon request.

THE CONTROLLER COMPANY OF AMERICA, at the World's Fair, were honored by a visit from Vice-President-elect Fairbanks and President Francis, of the Louisiana Purchase Exposition, on Tuesday, the 15th.

FRANK B. COOK recently received from two of the large Pacific Coast companies some orders for his type "M" pole-top cable terminals, one of the orders being for 200. Those Pacific States people in the matter of lightning protection are like the baldheaded man parting his hair—he doesn't have to. Lucky dogs!

VOLT-AMMETERS FOR TESTING.

AS important a piece of apparatus as any in an exchange is the voltmeter. By its means almost any trouble can be located and its nature determined. Louis M. Pignolet, 78 Cortlandt street, New York, has on the market an instrument of this character which embodies all the best points in design and yet is moderate in price. To those managers who prefer the use of ammeters in conjunction with voltmeters for testing, and also where storage cells are used, the combined volt and ammeter made by this manufacturer will be found to meet all requirements. Among the many uses to which this instrument can be put might be mentioned tests for insulation on long lines. As every telephone man knows, the high insulation of long-distance circuits is very important for their successful working, especially when their operation depends upon sensitive relays. Louis M. Pignolet has taken especial care to design these instruments for the most practical operations in tests, and will be pleased to communicate with any person interested desiring further information.

THE CONNECTICUT TELEPHONE AND ELECTRIC CO., INC., of Meriden, Conn., are specializing on a very light lineman's test telephone. These sets are appreciated everywhere by the up-to-date exchange man. One style is practically an exact duplicate of the Bell test sets, while the other style has batteries, solid back transmitter, etc. The company has issued a bulletin describing these sets, which will be sent on request. These sets are about 30 per cent. lighter than anything upon the market and are very strongly built.

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Sole Manufacturers GENESEO, ILL.

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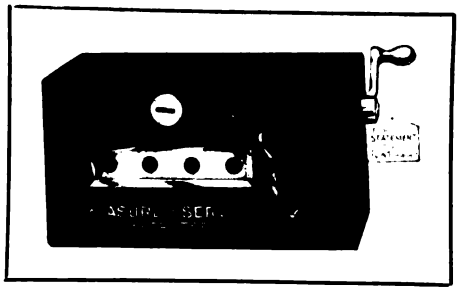

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OWING to the limited number of copies carried on file and the large demands, back numbers of THE AMERICAN TELEPHONE JOURNAL will hereafter be sold for twenty-five cents per copy.

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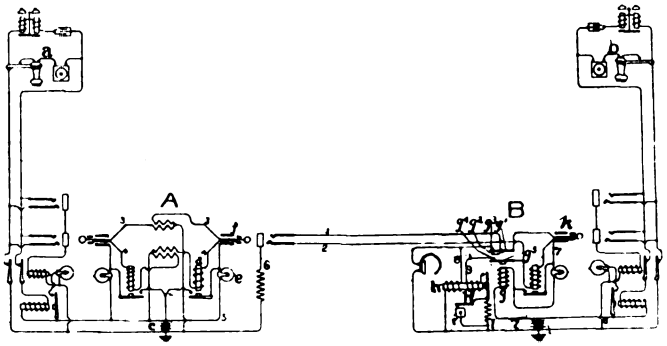
TELEPHONE PATENTS

BUSY SIGNAL FOR TRUNK LINES.

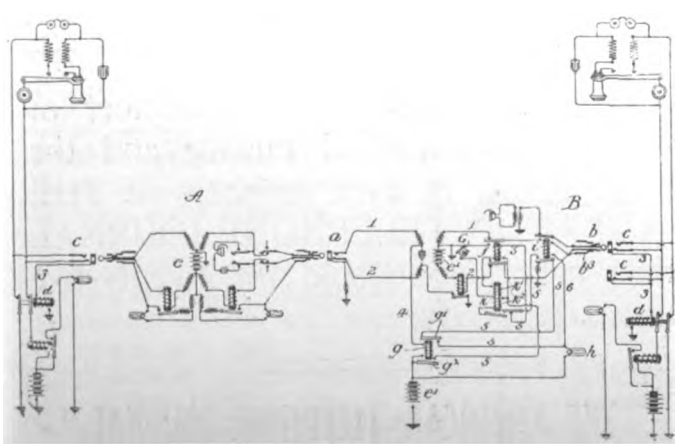
Frank R. McBerty, of Evanston, Ill., patents (No. 772,897) an improved busy signal for trunk lines, and assigns to the Western Electric Company. The object of this patent is to provide a busy signal for trunk lines so that the labor that the operators expend in testing may be avoided. The circuit is shown in the accompanying diagram, the operation of which is as follows: When the A operator receives a call for a distant office, she requests the B operator in the office desired to nominate a trunk line in the usual manner. This the B operator does over an order wire and then proceeds to test the line of the desired subscriber in the ordinary method. If the line is in use, the test current flowing through the tip of the B operator's plug *k* through conductor *8*



excites the test indicating magnet *h* and closes its armature, completing a circuit from the central battery at the *A* office through *2* of the trunk line and wire *9* which maintains the magnetization of the magnet *h* and brings the supervisory relay *d* under the control of the circuit controller *i*. Relay *d* when excited closes a shunt about the supervisory lamp *d*. This lamp was lighted by placing the plug *f* in the terminal jack of the trunk line and remained burning with a constant brilliancy. The circuit controller *i* is a kind of a commutator which is revolved at proper speed and through its action the supervisory lamp *e* is caused to pulsate in brilliancy, thus constituting a visual busy signal to the A operator and indicating to her that the line of the subscriber desired is engaged.

TELEPHONE TRUNK CIRCUIT.

C. A. Crapo, of Denver, Colo., patents (No. 772,871) an improved telephone trunk circuit. The object of this invention is

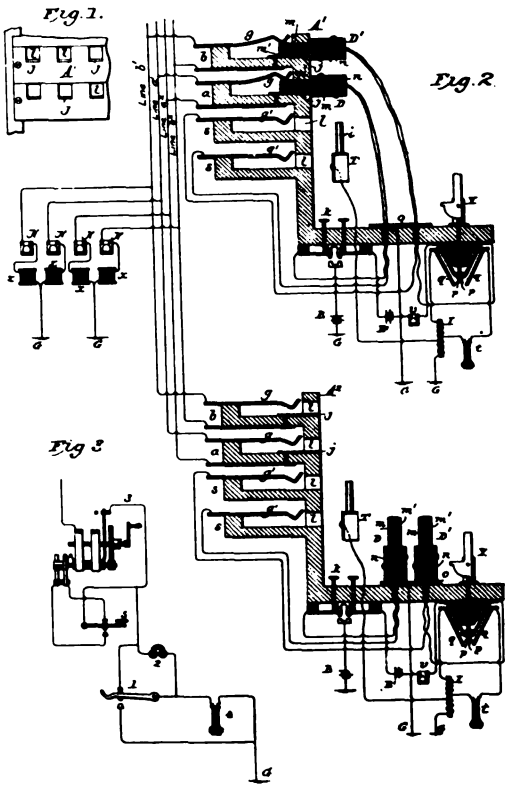


to provide an automatic ringing key to be used upon the trunk line positions upon common battery switchboards so that the subscriber may be called from the A operator's board. The circuit is illustrated in the accompanying diagram. After the A operator has instructed the proper B operator to put up a certain connection, she inserts a plug into the trunk jack designated. Then the relay *g* is excited by current from the battery *e*¹ in branch 4, through line conductor 1 and thence to earth. *g* being excited will draw up its armatures *g' g2* lighting signal lamp *h*. The B operator being thus notified that the A operator has plugged into the right jack, she will insert the trunk *b* into the jack of the desired line, then her work is finished. The insertion of the plug *b* completes local circuit *6 3* and excites relay *i*, completing the shunt circuit *5*, including winding *f* of automatic ringing key. Current from generator *G* then flows through winding *k'* of the disconnected relay *k* to the called line. But this is insufficient to energize the relay until the subscriber answers. When the receiver is removed increased current passes through *k'*, excites relay *k*, through winding of magnet *f* and substituting locking winding *k2*. The ringing key magnet being de-energized will re-establish the talking circuit.

MULTIPLE CIRCUIT.

M. G. Kellogg, Chicago, Ill., patents an improved multiple switchboard, and assigns to the Kellogg Switchboard and Supply Co. This invention relates to the Kellogg divided switchboard and has been in the patent office nearly thirteen years. The accompanying illustration shows the essential features from which it appears from Fig. 2 that the switchboard is divided into two parts A^1 and A^2. The substation is shown in Fig. 3. The ringing

Fig. 1.



generator has a commutator, so that it may supply either positive or negative current, depending upon key 5 being raised or depressed. Thus the subscriber can send whichever form of current to the exchange which he desires. Hence the signals either calling or clearing out may be polarized and thus controlled by the subscriber. The rest of the circuit is so easily traced from the drawing as to render further description unnecessary.

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THE WEEK'S MESSAGES

FINANCIAL.

STEWART, GA.—Stewart Telephone Co. has declared a dividend of 20 per cent.

MARSHALL, MICH.—The name of the Marshall Telephone Company has been changed to the Citizens' Telephone Company, and it is reported that its capital stock will be increased to $50,000 from $15,000.

DULUTH, MINN.—The Zenith Telephone Co. will spend one million dollars in enlarging its system.

OXFORD, N. Y.—The Oxford Valley Telephone Co. has increased its capital stock from $1,000 to $5,000.

BROWNSVILLE, OHIO.—The Gratiot & Brownsville Telephone Company has increased its capital stock from $5,000 to $10,000.

FRANCHISES.

HOPEDALE, ILL.—The Farmers Mutual Telephone Company of this city has been granted a franchise in the town of Mackinaw.

JERSEYVILLE, ILL.—The City Council has granted a franchise to the Kinloch Long Distance Telephone Co. of Missouri.

PORT DEPOSIT, MD.—The Town Council has granted a street franchise to the Martland Telephone Co.

ST. PAUL, MINN.—The Twin City Telephone Company has applied for an additional franchise to erect poles and overhead wires in certain streets and alleys in the city.

ELECTIONS.

COIN, IOWA.—At the annual meeting of the Coin-Northboro Telephone Company the following officers were elected: President, J. R. Harris, Northboro; vice-president, Chas. Hart, Coin; secretary and treasurer, P. A. C. Jonasson, Northboro. Directors—J. F. Whitmore, Coin; J. M. Dalby, Northboro, and A. T. Griffin, Hamburg.

HAMMONDSPORT, N. Y.—The Tyrone Telephone Company has elected the following directors: Philander La Fever, Monroe Sutton, Dundee, E. V. Biglow, Chas. Losey, Altay.

ROCHESTER, N. Y.—At a meeting of the Independent Securities Telephone Co. held in Rochester recently, the following officers were elected: President, Thomas W. Finucane; vice-president, Charles H. Poole; treasurer, Frederick W. Zoller; secretary, T. Harvey Ferris. An organization of the new company was perfected and by-laws were adopted.

WESTFORD, PA.—At the annual meeting of the Westford Independent Telephone Company the following officers were elected: President, W. S. McConahey; vice-president, J. E. Coline; secretary, H. D. Bennett; treasurer, G. H. Hurlbert. Directors, T. C. White, Geo. F. Marti and R. Fleming Blair. Manager, Geo. F. Martin.

NEW COMPANY NOTES.

ELKHART, IND.—The Pullman Telephone Company of Elkhart, Indiana, and of Edwardsburg, Michigan, has been incorporated with a capital stock of $10,000.

FLORA, IND.—The Flora Telephone Company has been incorporated with a capital stock of $25,000. Directors: W. E. Callane, H. A. Thomas, W. F. Wagoner and others. They have purchased the system of the Flora & Bringhurst Co-operative Company, and the Miller system.

BLAKEVILLE, IA.—The Blakeville Farmers Mutual Telephone Co. has been incorporated with a capital of $5,000. C. W. Smith is president.

COUNCIL BLUFFS, IA.—The Independent Telephone Co. of Council Bluffs has filed its articles of incorporation, and its application for a franchise.

NORWALK, IA.—The Middle Branch Telephone Co. has been incorporated with a capital stock of $1,200 by W. A. Cotinam and others.

HILL CITY, KAN.—The Mutual Telephone Co. has been incorporated with a capital stock of $11,000.

NEW MARKET, MINN.—The Star Telephone Co. has been incorporated with a capital stock of $10,000.

ARCHER, NEB.—The Archer Independent Telephone Co. has been incorporated with a capital of $50,000 by A. J. Harshberger, J. B. Templin and others.

OSHKOSH, NEB.—The Antelope Valley Independent Telephone Co. has been incorporated with a capital stock of $800 by W. J. McIntosh, J. Pile, W. W. Fought and M. Weatherby.

NEW HAMPTON, N. H.—The Winona Telephone Company has been incorporated with a capital stock of $2,500.

BARTON, N. Y.—The Ross Hill & Barton Independent Telephone Co. has been incorporated with a capital stock of $2,000. Dr. A. J. Terwilliger, president, and F. C. Dailey, secretary.

MARIETTA, OHIO.—The Caldwell Marietta Telephone Company has been incorporated with a capital stock of $25,000 by J. Kaiser, A. L. Gracey, C. B. Barry and others.

GEORGETOWN, S. C.—The Georgetown and Camp Field Telephone Co. has been incorporated by M. W. Pyatt and O. B. Skinner.

LEXINGTON, S. C.—The Citizens' Telephone Co. has been chartered here by J. E. Coughman and A. J. Fox.

MILTON, W. VA.—The Upland Telephone Co. has been chartered here to build a line from Milton to Upland, Glenwood and the Milton oil fields. The officers are: D. L. Irwin, president; J. H. Harshberger, secretary, and S. J. Troop, treasurer.

COMBINATIONS.

CULLMAN, ALA.—The Cullman Telephone Company's stock to the extent of a half interest has been purchased by S. L. Sherrill, of Hartse, from Walter Cable.

WEST FRANKFORT, ILL.—The Stamper Union Telephone Company has purchased the exchange of the Tri-County Telephone Company at Thompsonville.

MORGANTOWN, KY.—The Southern Electrical Construction Company has purchased the local exchange and will entirely reconstruct the system, after which, it is reported, it will turn it over to the Home Telephone Company at Bowling Green.

BALTIMORE, MD.—Articles of merger and consolidation have been filed by the Winchester Telephone Company of Virginia and the Cumberland Valley Telephone Company of Baltimore.

LAKE CRYSTAL, MINN.—Henry Graif has sold his interest in the Blue Earth County Telephone Co. for $6,000.

ARGYLE, WIS.—A. G. Hawley has purchased an interest in the Argyle Telephone Co.

MISCELLANEOUS.

STUTTGART, ARK.—The Stuttgart Telephone Company will be reorganized on January 2d, 1905.

LOS ANGELES, CAL.—The Home Telephone Company is busily engaged in installing new telephones.

RIVERSIDE, CAL.—The building of the Home Telephone Company is being rushed to completion as past as possible.

LEWES, DEL.—The Diamond State Telephone Company has received orders for 27 additional telephones in this city.

INMAN, KAN.—D. F. Penner is securing subscriptions to a farmers' telephone line.

OWENSBORO, KY.—The lines of the Home Telephone Company were damaged by fire due to being crossed with a heavy current.

GRAND RAPIDS, MICH.—The State Traffic Association of Independent Telephone Companies held a meeting in this city recently and discussed methods of business in securing and routing messages.

WOODSTOWN, N. J.—The People's Rural Telephone Company has over one hundred subscribers to start its system with.

COHOES, N. Y.—The Cohoes and Waterford Telephone Company has recently made many additions to its system and now has 750 telephones to install.

BERLIN, ONT.—A rural telephone company is being talked about which will build farmers lines in Waterloo County.

FREDERICKSBURG, VA.—The Toluca and Fredericksburg telephone line, extending from Toluca, in Stafford County, by Stafford Courthouse, Brooke Station and Boscobel to this city, has just been completed and will be in operation in a few days.

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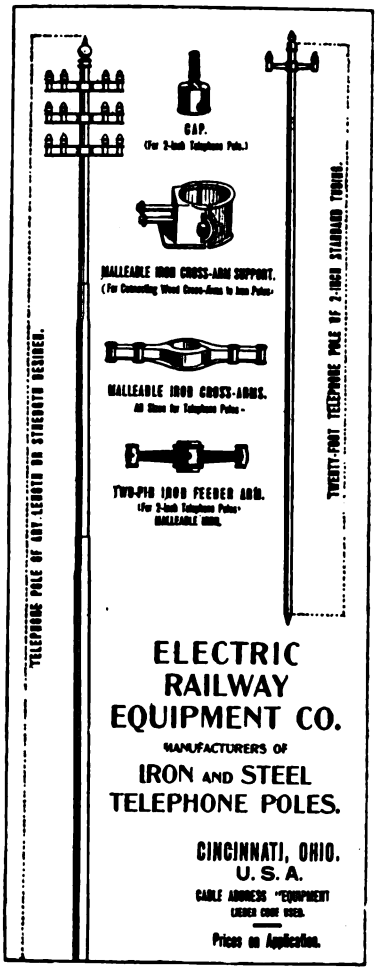

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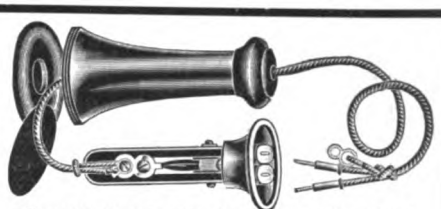

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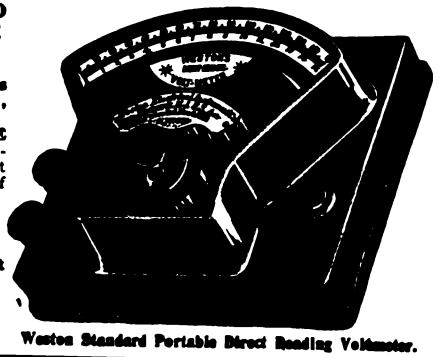
BERLIN—European Weston Electrical Instrument Co., Ritterstrasse, No. 88.
LONDON—Elliott Bros., Century Works, Lewisham.
PARIS, FRANCE—E. H. Cadiot, 12 Rue St. Georges.
New York Office, 74 Cortlandt Street.



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PERSONAL.

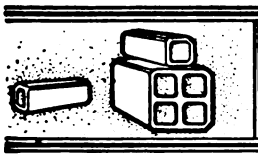
WALTER HARDINGER has been appointed manager of the Ithaca Telephone Company's system at Ithaca.

W. H. LINCOLN has been appointed assistant State superintendent for the Michigan Telephone Company, with headquarters at Grand Rapids.

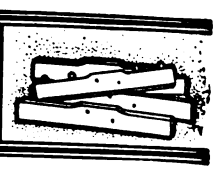
C. L. HOUK has resigned the position as manager of the Local Telephone Company at Norwalk, Ohio.

J. M. FLANAGAN has been appointed manager for the Michigan Telephone Company in Albion.

L. O. WILLIAMS has been appointed manager for the Buffum and Kinloch telephone exchange at Fulton, Mo.



New Construction in the Field



DES MOINES, IA.—The Mutual Telephone Co. is making extensive improvements to its system in this city.

EAST MOLINE, IA.—The Union Electric Telephone Company will connect their system in this town with the lines of the Interstate Telephone Company.

HILLSIDE, IA.—The Union Electric Telephone Company will build a line from this village to Rose Hill.

AUGUSTA, ME.—H. E. Emery is building a private telephone line.

KINGMAN, ME.—Mr. McFarland is constructing a telephone line.

MILLBURY, MASS.—The Millbury telephone exchange was recently increased in size to take care of 100 new subscribers. Extension will be made in the farmers' lines at Sutton and Millbury.

YPSILANTI, MICH.—The Washtenaw Home Telephone Company will construct a system in this city.

ALBERT LEA, MINN.—The 250 new instruments and switchboard ordered by the Albert Lea Telephone Company have arrived and will be installed at once.

ALDEN, MINN.—The Alden Telephone Co. is making another extension to its system.

BELVIEW, MINN.—The Redwood County Rural Telephone Company will establish an exchange in this city and will build an extension from Wabasso to Seaforth and thence to this point.

CAMBRIDGE, MINN.—The Twin City Telephone Company are making extensive additions to their service here.

CLARKFIELD, MINN.—The Clarkfield Telephone Co. has decided to build a new line this winter.

CLIMAX, MINN.—Good progress is being made on the Farmers' Rural telephone line which will be completed as far as Neby this fall.

COTTONWOOD, MINN.—The Home Telephone Co. will build three rural telephone lines.

DELANO, MINN.—The farmers of Lac-Qui-Parle County have organized a telephone company and will build a system and connect with the exchange at Madison.

GREY EAGLE, MINN.—R. H. Sliter will commence the construction of a telephone line, having been granted a franchise.

HARRISON, MINN.—The Harrison Union Telephone Company will extend its line from Peter Berglund's north into Irving.

HUNTLEY, MINN.—The Blue Earth Valley Telephone Co. will build a line to connect this town with Winnebago.

DASSEL, MINN.—The Dassel & Collinwood Telephone Exchange Company have their new exchange in running order. Long distance connections are made with toll lines of the Tri-State Telephone Company and two circuits are used.

LERDAL, MINN.—The Lerdal Telephone Co. is building its system.

LE SUEUR, MINN.—The Farmers' & Merchants' Mutual Telephone Company are building their tenth farmers' line along the old road to Le Sueur Center.

LONG PRAIRIE, MINN.—R. H. Sliter has made arrangements to install a telephone exchange at Grey Eagle.

NORTHFIELD, MINN.—The Northfield Telephone Co. will make numerous extensions in the near future.

PARKER, MINN.—The Steniger Telephone Company was recently incorporated with a capital of $50,000 to build a net work of the rural lines that will center at this place.

RAPIDAN, MINN.—The Citizens' Telephone Co. is building a line to Good Thunder.

RICHVILLE, MINN.—The telephone line has been completed between here and Perham.

SILVER LAKE, MINN.—J. J. Greaves is establishing a local telephone exchange at this place.

WASECA, MINN.—H. Jaehning is considering building a telephone line in this vicinity.

COLUMBUS, MISS.—The Citizens' Long Distance Telephone & Telegraph Company will erect a new building and construct aerial cable lines and other improvements. J. A. Richmond, manager.

ST. LOUIS, MO.—The Kinloch Telephone Company will construct a line from Alton to Jerseyville to connect with the Springfield system.

SEWARD, NEB.—The Seward County Telephone Co. will commence the construction of a local system at once.

TABLE ROCK, NEB.—W. A. Conklin is having an upper story put on his business house to use for a telephone central office.

CHESTER, N. J.—The Chester Local Telephone Company is making preparations to extend its system into suburban territory. A. P. Green is president and G. E. Conover, secretary and treasurer.

HIGH BRIDGE, N. J.—The Farmers' & Merchants' Telephone Company is arranging to extend its line from Annandale to Cokesburg.

BUFFALO, N. Y.—The Frontier Telephone Co. is changing the routes of its underground conduits in Niagara Square.

CANASERAGA, N. Y.—The Livingstone Rural telephone line has been extended to this city.

HAMBURG, N. Y.—The Inter-Ocean Telephone Company is building a line in this village.

HARTWICK, N. Y.—The Hartwick Telephone Co. will extend its system at once.

FINLEY, N. D.—The Union telephone line is to be extended.

GRAND FORKS, N. D.—The new Tri-State Telephone building on Fifth street is fast nearing completion and presents a very substantial building.

MOOREHEAD, N. D.—The Tri-State Telephone Company has constructed a line from Fargo to this place.

CINCINNATI, OHIO.—Sol. P. Kinion has completed a line from this city to Butler, Ky., where it will connect with Independent lines to Louisville.

WAUSEON, OHIO.—The N. W. Ohio Telephone Company is extending its system and will install a switchboard with a capacity of 600 drops.

EUGENE, ORE.—The Eugene-Florence Elmira Telephone Company is constructing a line from this city to the mouth of the Suislaw river, 80 miles distant.

ALLENTOWN, PA.—The Lehigh Telephone Company will install a private branch exchange in the new Allentown Bank.

CONNELLSVILLE, PA.—Work has been commenced on the line of the Tri-State Company, which will connect with Baltimore.

DOYLESTOWN, PA.—The Philadelphia & Easton Traction Company will construct a telephone line along its entire system.

LOVER, PA.—The local telephone company will connect with the Centreville Company in the near future.

WEST CHESTER, PA.—The West Chester St. Railway Company will install a telephone system along its lines and place telephones in all cars.

MARION, S. D.—A telephone line will be built from this town to Freeman.

BRIDGEPORT, W. VA.—The Belmont Telephone Company will run a line to the Lansing and Wheeling Creek mines.

MIDDLEBURY, VT.—The Addison County Telephone Company is extending its system in this city.

KENOSHA, WIS.—The Citizens' Telephone Company will complete its connection between Corliss and Elkhorn, connecting with the Badger State Telephone Company, thus giving Kenosha and Racine long distance connection with Madison, Gainesville, Veloit and Elkhorn.

LARAMIE, WYO.—The J. T. Jones Electrical Company will construct a telephone line from Elk Mountain to Hanna.

BROOKSIDE, W. VA.—The Belmont Telephone Company will complete its telephone cable system to this city within a short while.

MORGANTOWN, W. VA.—The Tri-State Telephone Company has completed its line from Uniontown, Pa., to Pt. Marion, Pa.

SPRING VALLEY, WIS.—During the next year a new rural telephone line will be built by the farmers in this vicinity from this place to Menominee, and another line to Glenwood.

ELLSWORTH, WIS.—The Pierce County Telephone Company will extend its lines.

LA CROSSE, WIS.—The line of the Tri-State Telephone Company has been extended to La Crosse.

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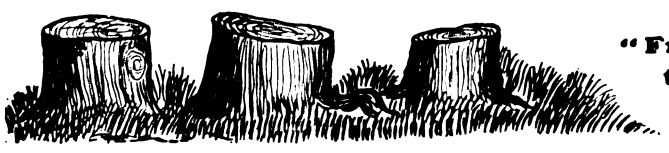
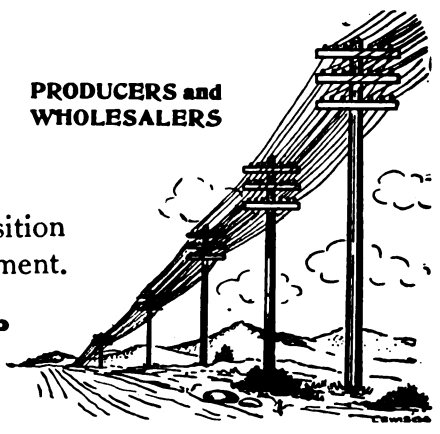
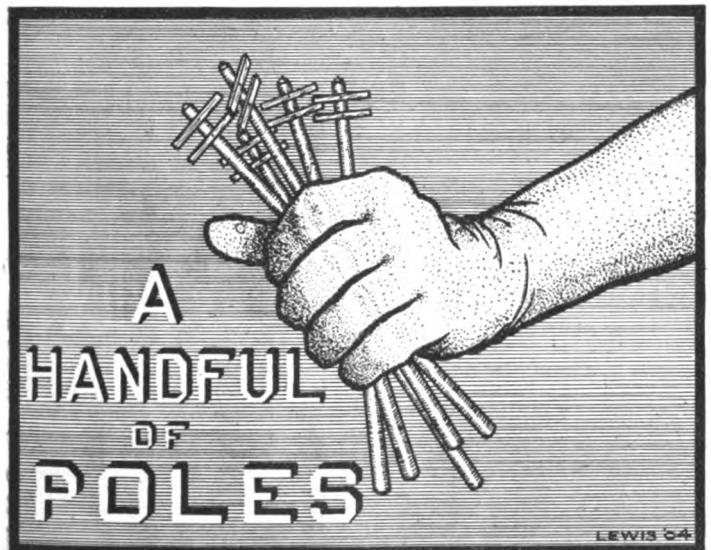


"From the Stump to the Line."





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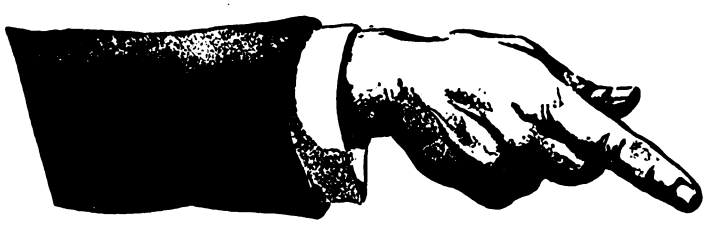

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" " 16—Operator's Set and Accessories
" " 17—Parts of Apparatus

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Vol. 10 NEW YORK—DECEMBER 3, 1904—CHICAGO Number 23

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Contents, Page 2. Advertisers' Directory, Page 9.

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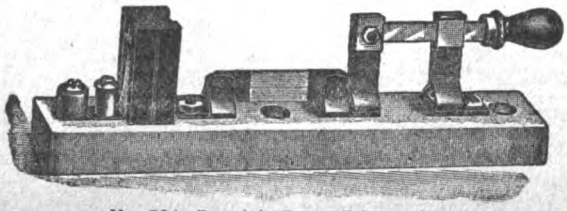

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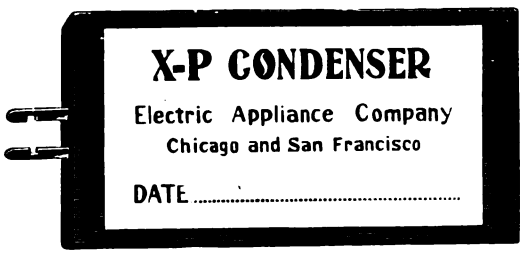

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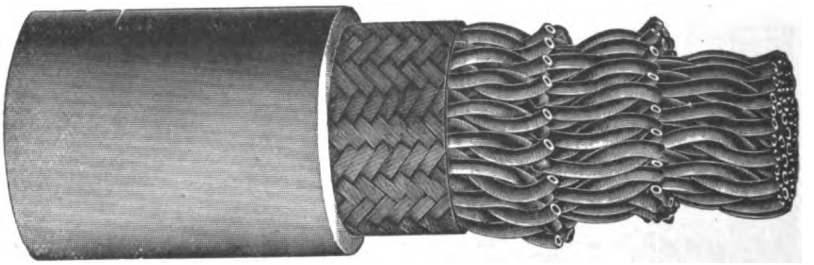

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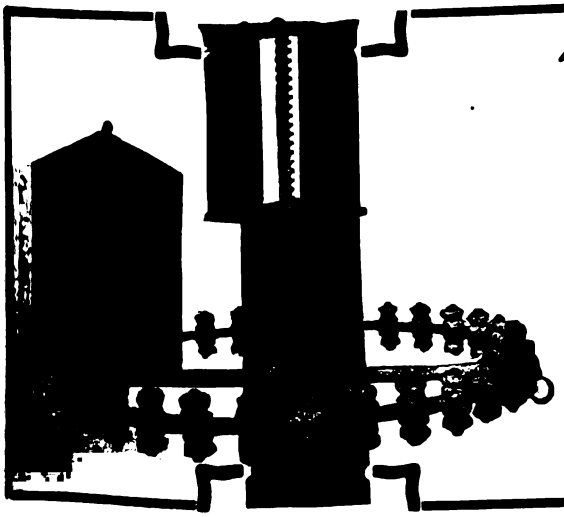

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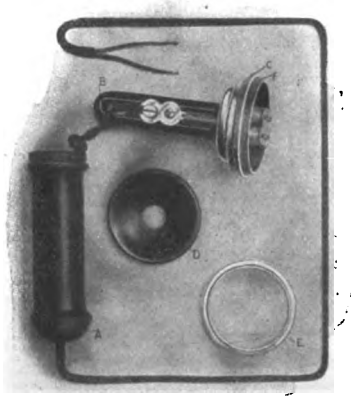

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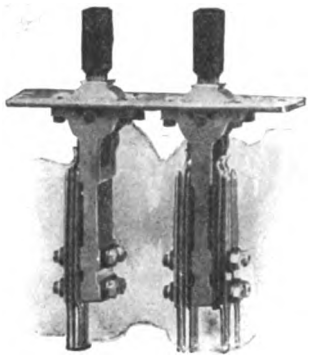

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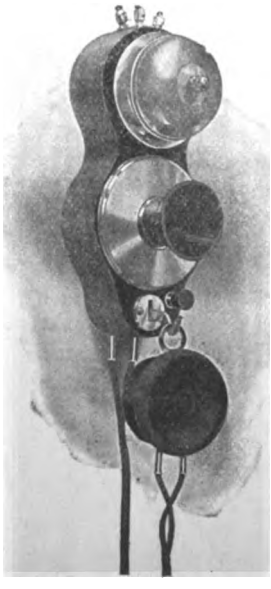

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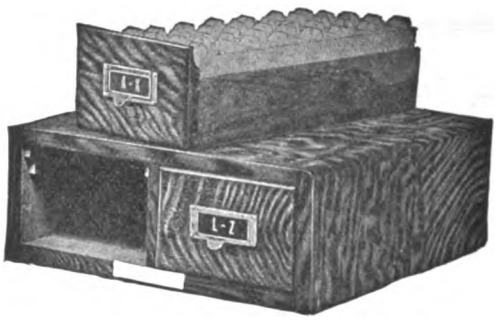

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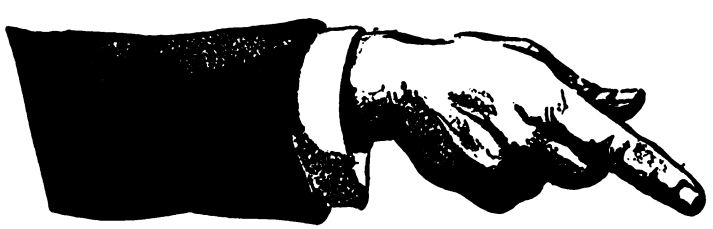

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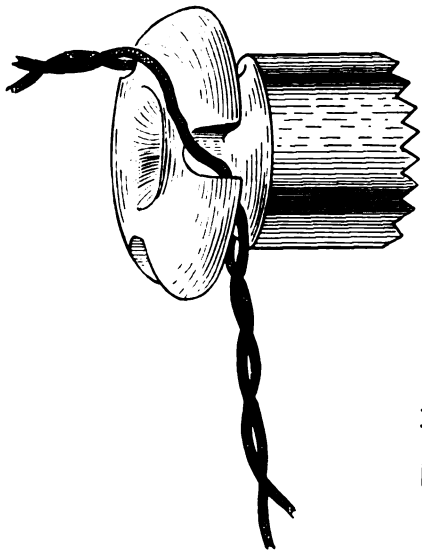

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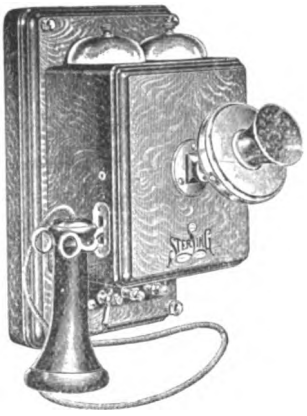

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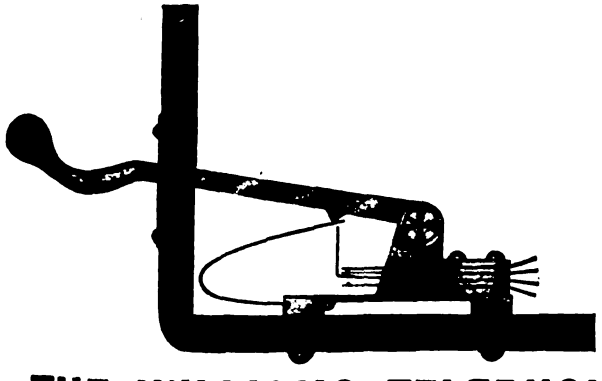

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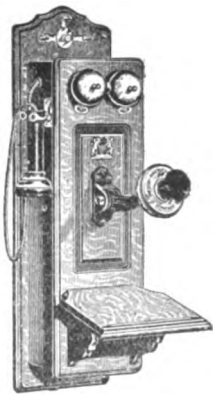

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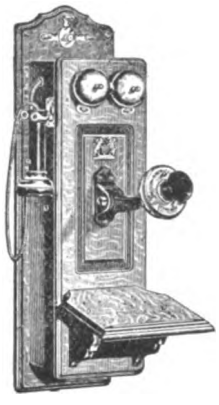

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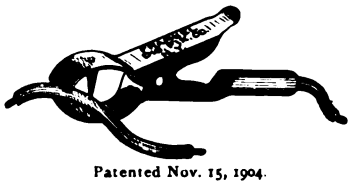

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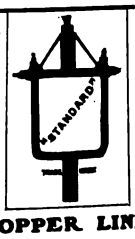

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THE USE OF SURPLUS FACILITIES

By Arthur Vaughan Abbott.

THERE are certain portions of every telephone plant which, from the nature of the business, must always be but partially employed. Such is notably the case with the wire plant. Take the pole line, for example; the expense of providing the poles, erecting and painting them will be approximately the same whether they carry one wire or many. Of course, there may be a slight variation in the cost, depending upon whether large and heavy lines are constructed or whether small or light ones. Similarly in the building of underground lines. The cost of tearing up the pavement and of excavating the trench is very nearly the same whether one duct be installed or a large number.

In order to provide for increases in business from time to time, telephone companies are apt to build wire plant facilities considerably in excess of the immediate needs. In many cases it becomes impracticable to accurately foresee the demands of the future, or the telephonic population may change in such a manner as to cause a surplus of facilities to exist in some districts. In a general way, statistics show that from 20 to 30 per cent. of the cost of the telephone plants is absorbed in such facilities which are not fully employed; and. could some way be devised for utilizing them, the plant would become correspondingly more remunerative. From time to time suggestions have arisen looking towards the employment of these facilities in some other direction. It has been suggested that the telephone company should adopt some sort of fire alarm system, which could be used either in connection with the existing wire plant, or could be made to absorb some of the surplus facilities. The same idea has arisen in connection with electric light plants.

In the past there has been the strongest endeavor to keep electric light and telephone circuits as far apart as was practicable. So long as telephones were operated upon grounded circuits this was absolutely essential, for if the telephone lines and the electric light leads approached each other the telephone lines were rendered so noisy that conversation became impracticable. The rapid extension of electric light facilities, and the increasing use of electricity for other purposes, such as street railways, has now proved that the only salvation for the telephone was to have recourse to completely metallic circuits, and that it was impossible to give satisfactory service over grounded lines. For years the American Bell Company fought for the maintenance of grounded lines, by all of the legal artifices to which it was possible to resort; but in every instance it has been so signally defeated, and the inexpediency of the grounded line has been so clearly demonstrated, that at present it is only employed by small users in remote country districts, where the quality of service is not of marked importance.

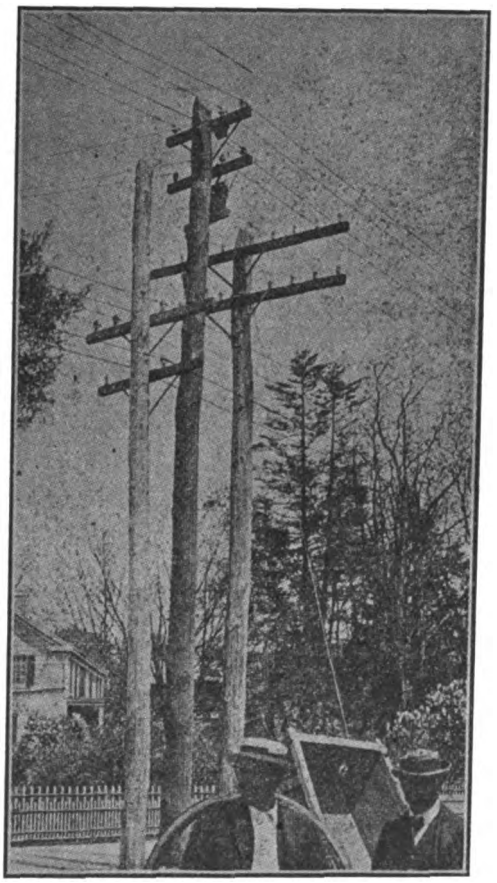

Fig. 1.
Fig. 1. Showing Three Lines of Poles on Same Side of street.

With the banishment of the grounded lines, the chief obstacle to operating electric light and telephone lines in proximity to each other has disappeared. Owing to natural conservatism, there has always been and still exists a great prejudice to allowing the two classes of electric conductors to occupy the same routes; but recently a number of instances have arisen which go to prove conclusively that, with proper precautions, it is perfectly feasible to operate electrical currents of all description heterogeneously mingled along the same routes. Take, for example, the open conduit pole line: Many circumstances often arise that require two or more companies to use the same right of way. It may happen that two electric light companies, two telephone companies or two telegraph companies are all seeking franchises in the same town. Naturally each desires to secure the route which will enable it to distribute its facilities in the best manner and at the least expense. As the streets and highways are only built with two sides, it is a physical impossibility for each of the six hypothecated companies to have one side of the road all to itself, and either some mutual compromise must be reached, or some of the companies must abandon the field, or some must consolidate.

Now, it is obvious that, if some mutually satisfactory, fair agreement be reached, the solution of the right of way problem is accomplished; and there is a further economy secured by so designing the circuits as to enable two or more of the companies to occupy the same poles. There is also now a strong tendency for municipalities to compel all circuits to be strung upon one side of the street, and in many cases ordinances are so drawn as to compel the companies to a mutual occupancy of the same set of poles. Even when franchise restrictions do not exist, it is often difficult to secure the consent of the property owners to the use of both sides of the highway, and frequently much dissatisfaction is expressed when more than one pole is reset.

For example: Figure 1 is an illustration where, owing to franchise restrictions, three companies were compelled to place poles upon the same side of the street, and as there was no hindrance to each one erecting a pole for its own circuits, the disfigurement which resulted is too obvious to need comment. Contrast Figure 1 with the situation shown in Figure 2, which represents the top of a pole occupied jointly by a telephone company and an electric

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light company, on which the lowest cross arm carried two single phase circuits. For some years this condition existed, and, so far as the telephone subscribers were concerned, no complaints were offered. Consider the economy which would result provided an amicable living arrangement could be arrived at, whereby both companies could mutually occupy the same right of way; or the alternative of the telephone company going into the electric light business, at least so far as might be necessary to build and supply the necessary circuits, that could in many cases be profitably rented to a company desiring to supply electric light and power. There is no doubt that there are good and valid objections to the joint occupancy of poles; but it is a very grave question as to whether the saving and the greater remuneration to be expected upon capital investment does not more than counterbalance all of the objections which have been advanced.

From an operating standpoint it is argued that it is more expensive and difficult to work upon a pole line which carries two sets of wires. This contention is no doubt true, but very few telephone companies use lines carrying but one cross arm; and, so far as the lineman is concerned, it makes no difference whether he is climbing through the wires of one company or another, the difficulty of access to the upper cross arms being precisely the same in either case. Nor is the expense of maintenance increased, for it is no more expensive to repair the upper set of wires when the lower belongs to another company than when it belongs to the one whose wires are in need of attention. It is, however, well to exercise great judgment in designing the arrangement of the circuits. The electric light and power wires are notably larger, stronger and less numerous than the telephone wires, and consequently it is desirable to place these wires on the upper cross arms, and string the telephone wires on the lower ones. Then the greater number of circuits can be reached with much less exposure to the repair man than is the case when he is compelled to crawl through the high tension circuits.

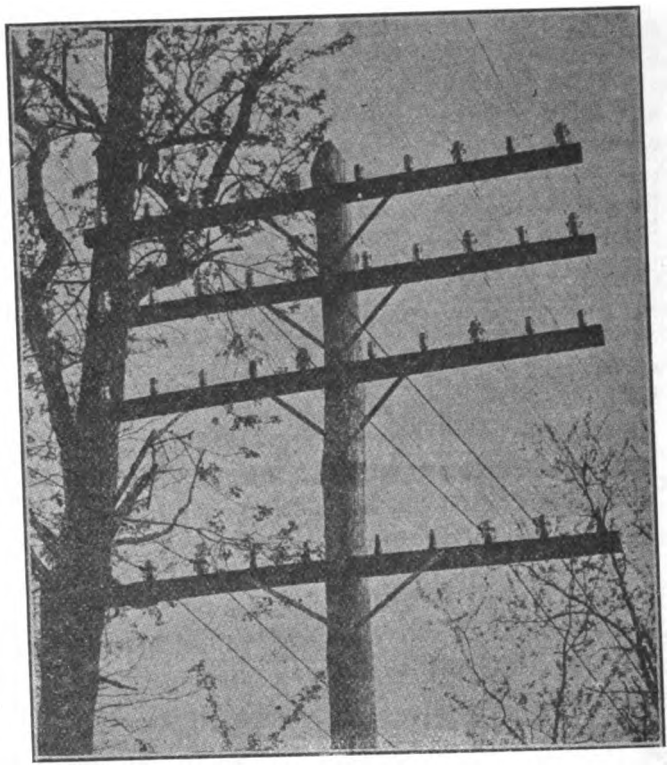


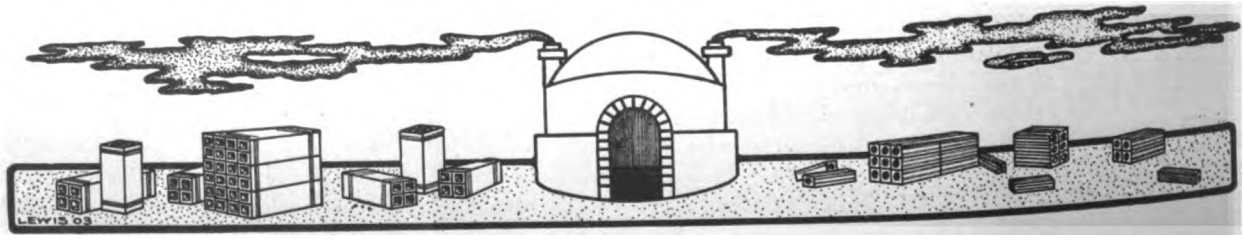
Fig. 2.

Again, the probability of rupture of the wire is much greater in the case of the telephone circuits than with the electric light or power wires, on account of the greater strength of the latter. If a telephone wire ruptures and drops upon a telephone circuit underneath no harm results, whereas if the telephone wires are placed above the high tension circuits, a broken telephone wire may fall upon and cross an electric light line and thus lead a dangerous current to the exchange or the premises of some of the subscribers. So, for these reasons, it is desirable always to place the high tension wires on the upper arms.

In the past the telephone companies have assumed that the presence of high tension wires upon the same pole will interfere by leakage with the low tension circuits, and prevent satisfactory operation. With the improvements in insulation which now exist, no electric circuit should be built with insulation so defective that even a sensitive receiver can be injured by actual leakage. Finally the telephone companies have in the past scored a strong point in advancing as an insuperable objection to the operation of joint pole lines that it was impracticable to obviate such an amount of electrostatic or electromagnetic induction as would impair the operation of two lines. No doubt this is the most serious obstacle, but it is by no means an insuperable one. On the contrary, the instances already cited show that such operation has already been put into practice successfully, and it would be easy to cite hundreds of other cases. Provided the telephone lines are arranged symmetrically with respect to the high potential circuits, and provided the latter are reasonably well balanced and sufficiently transposed, little difficulty will be experienced. Passing now to underground lines, similar conditions exist.

In the conduit line both the telephone circuits and the power wires are enveloped in lead-covered cables, encased with the best insulation, and so arranged that all probability of actual leakage or crosses between the two sets of circuits is reduced to the smallest conceivable minimum. Again, each set of circuits occupies a duct by itself, and is entirely separated from all of its neighbors; and finally both telephone lines and power wires are transposed so frequently as to prevent inductive disturbance. Take, for example, the more recently constructed subways in New York, St. Louis and Chicago. Many instances could be cited where two sets of companies mutually occupy many hundred feet of conduits and are living together in the most amicable manner. Rochester furnishes a pertinent example. Some months ago the Bell Company endeavored to restrain an electric light company from placing its mains in proximity to the telephone lines, but it was shown by photographic evidence that along a number of the principal streets the electric light companies and the Independent telephone company were mutually occuping the same conduits without the slightest interference. To cite further instances is superfluous. And so the shrewd telephone manager immediately goes about and easily finds many methods whereby his surplus facilities may be profitably employed.

At the present time some of the largest Independent companies are considering the addition of electric light and power business to the telephone industry, one instance being the Maryland Telephone Company, of Baltimore. The Keystone Telephone Company, of Philadelphia, recently entered into negotiations for the sale of its subways to an electric lighting company and the parties interested in the Pittsburg & Allegheny Telephone Company have entered the electric lighting field.



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THE TELEPHONE IN AUSTRALIA.

AN INTERVIEW WITH JOHN HESKETH.

Electrical Engineer for the State of Queensland, Postmaster-General's Department, Commonwealth of Australia.

ONE of the most interesting visitors to the late International Electrical Congress was Mr. John Hesketh, telephone engineer for the State of Queensland, Postmaster-General's Department, Commonwealth of Australia, who made a tour to the World's Fair with a view to securing ideas upon the most up-to-date construction and operation of telephone systems.

THE AMERICAN TELEPHONE JOURNAL was fortunate in securing an interview with Mr. Hesketh, and we herewith furnish the substance of the matter discussed:

"Any one wishing to join the telephone service must be appointed by the public service commissioners, and is required to pass an examination. The examination of the telephone officers would be of a two-fold nature: first, technical; secondly, the public service, or literary examination, which is the ordinary qualifying examination for the public service. It would depend altogether on the position the officer was to fill, as to what scope the technical examination would cover. In the case of a lineman it is made much simpler than in the case of a technical officer. Female operators are employed wherever possible. Their hours of duty are approximately eight working hours a day, from which may be taken the rest periods in the morning and afternoon, and the luncheon period, but the average time actually worked per fortnight is about eighty-eight hours. They commence at about the age of sixteen, at a salary, speaking from memory, of £26 per annum, and there is a sliding scale by which they advance until they reach the age of twenty-one years, when if they have had three years of service, they must receive £110 a year. The advances are made on a certificate of the officers immediately in charge of the person concerned, as to good behaviour, etc.

"When you ask, what are the rates charged in Australia, it is well to remember that the purchasing value of money is widely different from what it is in the States. Further than that, it is not the function of a government to make any of its departments a profit-making concern. That is to say, if a government provides the best possible service and pays all proper charges, then it has done all that it is reasonably called upon to do, even if it makes no profit. The rates in Australia, therefore, have been designed to this end, and are low when compared with the rates in the States. For instance, the rates in Melbourne and Sidney on direct lines are $45 a year (£9). The population, roughly, is between 400,000 and 500,000. We have very few long distance lines, the longest being about one hundred and sixty-five miles.

"We have not as yet developed party line service. So far our development in that direction has been restricted to extension sets, that is to say, two sets working on one line, the distant station being switched on by the first.

"The Commonwealth of Australia includes New South Wales, Victoria, South Australia, Western Australia and Queensland, on the main land, and Tasmania, a southern island.

"The people of Australia do appreciate telephone communication when they can get it, and there is at the present time a very strong movement in favor of fuller development, particularly of farmer lines.

"We have as yet no common battery exchanges, and the magneto exchanges are many of them out-of-date, therefore, it is because the Postmaster-General wished to know what was the present best modern practice in the States that he sent me over here to investigate such matters, so that on my return I shall be able to advise him what is best to do.

"Speaking generally, we have not nearly so large a development of telephones per 100 population as we might hope to have. In the largest centers we have only a development of between two and one-half and three per cent. So there is plenty of room for expansion.

"A little apparatus is made in Australia, but not very much, not nearly sufficient to meet our requirements. As yet no cable or wire has been manufactured. For details of cost I am compelled to refer you to the published accepted prices in the *Government Gazette*. In this regard, it is just as well to say that we publish all accepted prices, and there is no difficulty in any manufacturer getting to know exactly the price paid for any article.

"Tenders for equipment are called by advertisement in the *Government Gazette*, and in the leading journals of the State capitols,

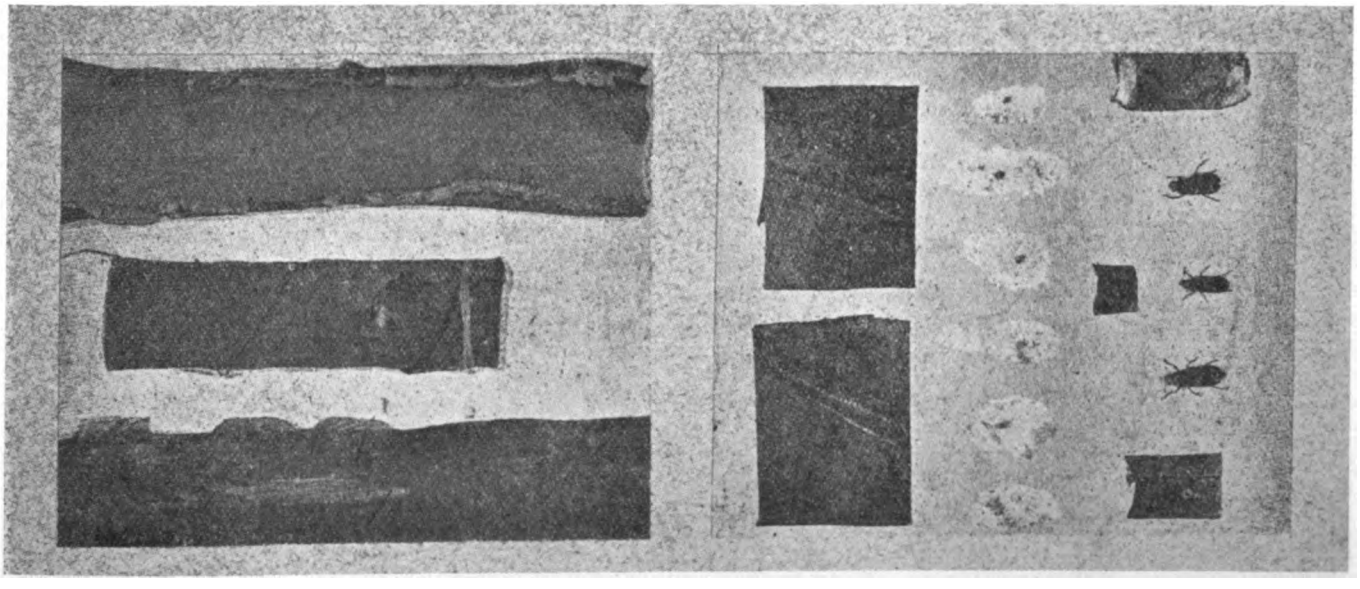

FIG. 1.—BORINGS (PERFORATIONS) BY "GRUB" OR LARVA OF BEETLE ECLONERUS SP. CHARTERS TOWERS.

View from within and from without, with grub in action. Only the light spot represents scales of lead.

FIG. 2.—ECELONERUS BEETLE.

Three specimens. Larva case on, and perforations in, tarred parcelling; larva case on white-leaded parcelling; perforations in lead.

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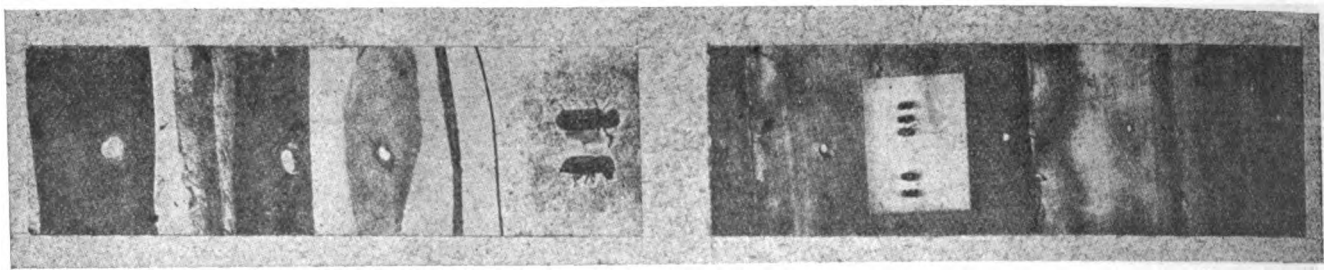

FIG. 5.—BOSTRYCHUS JESUITA. FABR. JESUIT BEETLE.
Perforations shown passing successively through tarred tape parcelling, lead sheathing, untarred tape surrounding conductors, and metal foil covering of individual copper wire.

FIG. 4.—XYLOPERTHA BEETLES.
Perforations in lead; 1, 3, and 5, perforations viewed from outside; 2 and 4, from within sheathing.

and also in the case of local requirements in the journals circulating in the area for which the requirements are advertised. We have no system of direct communication with manufacturers.

"The opening for manufacturers depends altogether upon the extent to which the treasurer has funds available for telephone work. This is the only limiting factor. The Postmaster-General controls the posts, telegraphs and telephones of the whole Commonwealth of Australia.

"It seems to me that the most reasonable way for the American manufacturers to get in touch with our market would be for them to obtain copies of the *Government Gazette* to see what lines

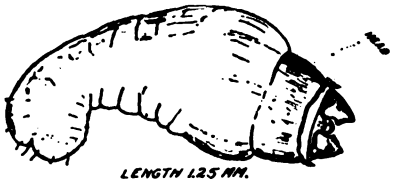

FIG. 3.—ECELONERUS BEETLE.

we are calling tenders for, and submit their standard apparatus designed to most nearly meet our requirements. On the extent of the requirements, as seen by the demands in the *Gazette*, the manufacturers should be able to have a very fair idea as to whether it would pay them to send a representative to Australia as you suggest.

We use just whatever apparatus meets our requirements at the best price. We call tenders for our requirements to fill specifications, and we carefully adjudicate on the tenders received, and give the order altogether on the price, the qualities being equal. In New South Wales, we use Ericsson instruments largely. In South Australia, we have a considerable portion of English manufactured articles, etc. Each place decides its orders on the most favorable tenders.

It is practically impossible to give any details of the scope of our different systems without entering into too long a description of our methods. We have various systems of underground and aerial construction, depending, of course, on the district. In an area so vast as the Commonwealth of Australia, approximating three million square miles in extent, we have such a variety of conditions that the construction and methods must be modified to meet the local requirements of each case. It would be too lengthy a matter to here describe all the different methods, but speaking generally we adopt what may be called standard methods of both underground and aerial construction.

When the inhabitants of any particular town require telephone facilities, they petition the Postmaster, laying their requirements before him. He causes an inquiry to be made as to the probable business resulting from the establishing of a telephone exchange system. On the result of this inquiry action is taken. Speaking generally, the Postmaster-General will establish telephone exchanges in any town where a guaranty is given of twenty-five subscribers."

Besides conducting a very thorough investigation of telephone conditions from every point of view, Mr. Hesketh found time to deliver a paper before the International Electrical Congress which dealt with a new danger to lead-covered cables to which his attention was drawn in 1896, saying in part:

The cables in which the defects were found were of various kinds, the following being the chief types:

(1) Copper conductors, fibrous insulation, anti-induction lead-foil serving, lead-sheathed, and served with tarred tape.

(2) The same, but served with lead-painted tape.

(3) The same as in (1) but with the sheath composed of two layers of lead, a serving of Stockholm tar being placed between them.

(4) Paper-insulated conductors, plain lead-covered.

These cables were all suspended in approximately similar manner from metal hangers on steel bearing-wires; the bearing-wires and sheath of the cables being connected with earth at each pole.

The holes found in the cable sheathing were of various sizes from 1 mm up to 6 mm diameter. They did not uniformly penetrate the lead, in some instances only entering to a depth of 1 or 2

FIG. 6.—ORTHORRHINUS CYLINDRIROSTRIS. FABR.
A lead-gnawing beetle; males and females. Lead-covered conductors, illustrating its gnawing habits. Lead sheathing with perforations probably made by it. *Belus Sp.* (2) Found to gnaw in confinement.

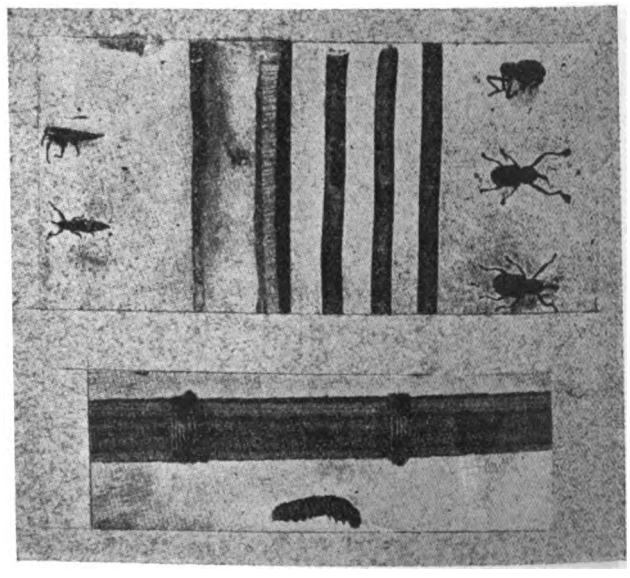

FIG. 7.—XYLEUTES BOISDUVALI. ROTSCH. (ORDER LEPIDOPTERA.)
Partially grown caterpillar, and hole through conjoined lead-covered conductors made by it in effecting exit from telegraph pole.

mm while in others the perforations were complete. There did not appear to be any general damage to the adjoining portions of the cable; that is to say, the damage was confined to well-defined holes either partly or completely piercing the sheathing. A general gnawing of the cable was obtained only when the beetles were in confinement. Fig. 6 shows clearly the difference between the general damage to the small lead-coverd conductors by the beetle in confinement and the clear-cut hole in the larger lead sheath of the cable.

The first direct evidence that insects were the cause of the

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trouble was found at Townsville in 1903, when the black Jesuit beetle was found in holes in the cable there. Very shortly afterward, very complete investigations carried out by Mr. F. Rosender, telephone officer at Charters Towers, produced the evidence which is embodied herein.

The remedy usually applied when a fault developed in any cable was to have the cable dried out, either naturally or artificially, when the rain ceased, and then close the holes with solder. A remedy for the trouble as a whole has not yet been found.

As the question became one of importance it was referred to the Entomologist for the Queensland Department of Agriculture, Mr. H. Tryon, who wrote a most exhaustive supplementary paper upon it. This supplementary paper being deemed, however, too specially entomological for inclusion as a whole in these transactions, I have extracted fully from it and desire here to acknowledge my indebtedness to Mr. Tryon for his most valuable assistance in so special a subject.

Figs. 1 and 2 show the beetle Ecelonerous (order *Coleoptera*, family *Anthribidæ*) which had been provisionally associated with the beetle larva that undoubtedly traverse lead by gnawing a passage as it proceeds.

Fig. 3 is a drawing made by Mr. H. Tryon from completely dried-up samples of larvæ submitted to him.

The lead-boring habit of this larvæ was brought to light by Mr. F. Rosender, Charters Towers, the original discoverer of the above-mentioned objects and of the grubs or larvæe associated with them. Mr. Rosender not only found these grubs in the perforations while still in process of being made, but he transferred the grubs and their dwellings still attached to the tarred tape, to sections of lead sheathing which he could keep under observation, and he had the good fortune to witness in one instance the act of perforation being pursued by the grub and the method in lead tunneling that it adopted. The specimen so obtained is shown in the center of Fig. 1, where the "mullock-heap" of lead made by the grub can be clearly seen. The specimen from which the photos were taken is also exhibited.

Fig. 4 shows the beetle Xylopertha (order *Coleoptera*, family *Bostychidæ*), of which four dead specimens were, in October, 1903, found in as many perforations met with among numerous others that occurred in a lead-sheathed aerial telephone cable at Townsville. Mr. E. A. Towell, telephone officer at Townsville, collected these specimens and also observed a living specimen emerge from one such hole, proceed along the cable for about a foot and then return on its course. Forty such holes were found in one cable at Townsville.

Fig. 5 shows the beetle Bostrichus Jesuita, Fabr. (order *Coleoptera*, family *Bostrychidæ*) or Jesuit beetle, which is very common in Queensland.

Fig. 6 shows the Elephant beetle (*Orthorrhinus Cylindrirostris* Fabr; order *Coleoptera*, family *Curculionidæ*) and the damage caused by it. When in confinement this beetle has gnawed the lead from covered wires, as shown in the illustration. Mr. Roseneder has also remarked clear-cut holes in the lead sheathing of the telephone cables not corresponding to those made by any other insect that at Charters Towers similarly attacks this substance.

Fig. 7 represents the only instance of the damage to lead-covered wires by this caterpillar (*Xyleutes, Boisduvali*, Rotsch; order *Lepidoptera*, family, *Cassidæ*) that has so far come under notice.

THE CUMBERLAND AGAIN SEEKS A FRANCHISE IN EVANSVILLE

By L. B. Sisson, Special Correspondent.

THE city of Evansville is once more in difficulties with the Cumberland Telephone Company Four months ago the company submitted a proposition to the city council along the following lines: In return for an exclusive franchise for forty-five years the Cumberland Company would pay the city $2,250 a year, or a total of $100,125. No limit was placed upon the maximum rates, which left the city at the mercy of the Cumberland.

Although the mayor was apparently in favor of granting the franchise, public opinion was too strongly formed against it, and the Cumberland withdrew. Now, however, it has resubmitted an almost identical proposition. Just where it hopes to gain its point is not apparent, since the newspapers, notably the Evansville *Courier*, which took up the fight in August, have again pointed out to the people where the danger lies. In a recent article the *Courier* says:

"The Cumberland Company has submitted to the city the same franchise presented three months ago, or in the early part of August. Why the company thinks its chances are better now than then we do not know. The situation has not changed. The same objections prevail now as then, to letting such a franchise or any franchise at the present time. It appears to be the last throw of the dice by the Cumberland Company, hoping to win a franchise on favorable terms before the decision of the United States Court of Appeals is handed down, putting it on the same footing as other companies offering to furnish the local telephone service of the city of Evansville."

This suit above referred to was brought to determine the Cumberland's standing in Evansville. It claims to have a perpetual franchise, which it acquired as one of the assets of the old Evansville Citizens' Company, which it bought out. This the city denies.

Attorney Cranbury for the Cumberland Company stated before the council at a recent meeting that he had strong hopes of winning the case, yet in the same breath he declared that the Cumberland Company would give $100,125 to be sure that they had a forty-five-year franchise. As the franchise that is being fought for is perpetual, how strongly he believes that the Cumberland will win its case against the city is evident without further comment.

In introducing the franchise Attorney Cranbury put up the customary intimidating argument that if the franchise was not accepted the Cumberland Company would abandon Evansville, a city of 70,000 people, the center of its system for 100 miles around, rather than pay one cent more than $2,250 a year for forty-five years. He claimed that if concessions were made in the shape of the fixing of maximum rates that the action would establish a precedent that would jeopardize the Cumberland's business in every large city in which it did business, and claimed that he had had great trouble in getting the directors to agree to even giving so much as $2,250 a year in return for a franchise. If the franchise were granted he again put forth the customary proposal to have the suit against the city dismissed at the cost of the plaintiff. The costs are about $4,500 for each side.

In discussing the franchise the council objected that no maximum rate was fixed, stating that the term of life was too long and the compensation was inadequate. Mayor Covert, who four months ago at the previous presentation of the franchise was an open Cumberland man, was noncommittal as to his position. The mayor, though, is still apparently friendly to the Cumberland interests, for the first broaching of the new proposition was entrusted by the company to him in a star chamber session of the council. That he was unsuccessful in his efforts was proved by the objections raised by a majority of the members of the council in the open meeting. No action was taken by the council on the matter, and it will be discussed again in the next meeting.

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PRACTICAL MECHANICS IN TELEPHONY

By Edward Schwartz.

TO exchange managers as well as manufacturers the construction of the various pieces of apparatus is very desirable. A thorough knowledge of the mechanical design is most important, since the successful operation of any part of the apparatus depends entirely upon the design and materials used in its construction. In considering this important detail let us first take, as an example, relays.

The construction of a relay embodies many points of particular value which must be thoroughly understood to ensure its successful operation. The frame, armature and core must be thoroughly annealed. To best secure this result the following method is suggested: All parts should be machined into their final state, that

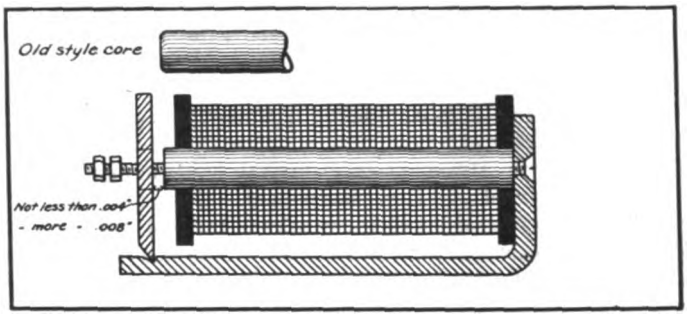

Fig. 1.

is, all holes should be drilled and tapped, all filing, turning and shaping should be done so that there will be no necessity for any machine work being done upon them after they are annealed. Place the parts in an iron pot and thoroughly pack with dust iron chips or borings, being careful that parts do not touch each other. The chips which are used for this purpose must be of cast iron and thoroughly clean. The only way to secure this is to burn them out. If this is not done the smoke and dirt from the heat will cause them to turn off color and the parts will not be annealed.

The pot should then be made perfectly airtight after the cover has been placed in position by means of a layer of clay at all seams. Place the pot in a furnace in such a manner that an equal amount of heat will be available on all sides. This is important, for if the heat is centralized at one point it will be impossible to anneal all the parts the same, consequently some will be harder than others. The best results are obtained from a charcoal fire. This is on account of the uniformity of the heat. Gas should not be used because there is a liability of the blast forcing the gas into the pot, which will discolor the parts, showing that a carbonizing effect has taken place. This causes the iron to become hard, and consequently the effect of softness which was sought will be lost. The pot should be brought to a cherry red and then allowed to cool off in the ashes of the furnace. Do not open the pot until it is thoroughly cooled or the same trouble will be caused as was mentioned in the use of gas.

The question will in all probability arise, Why is it necessary to drill and tap and do all the machine work previous to the annealing process? The answer is this: If the parts are machined after annealing the contact of the tool with the iron surface causes carbonization, which in turn causes hardness. Should the iron possess the slightest degree of hardness it will be possible to magnetize it, and this is the very result that is sought to be offset by the annealing process.

If the iron can be magnetized in any manner it shows that the annealing process has not been thoroughly carried out. A good test is to plunge the part to be tested after it has been subjected to magnetization into a heap of fine iron filings. If any are picked up it is evident the iron is useless for the purpose intended. Another trial method is if the part comes out of the furnace in as finely a polished state as it went in it is thoroughly annealed, but if it shows scale or has turned a dull or blue color it is not. Great care should be taken after the annealing process has been completed that the parts are not roughly handled.

Cores for relays when machined should not have the edge chamfered off which is to be nearest in contact with the armature. The reason for that is this: The area of the pole presented to the armature should be as large as possible. Now, if the edge is rounded off so much iron is lost, and consequently the area presented to the armature is smaller and will not have as great an attractive power as it would were the edges squared. This is illustrated in Fig. 1. In assembling relays the distance between armature and core should not be over eight-thousandths of an inch and not less than four-thousandths of an inch between the core and the armature at the closest point that is illustrated in Fig. 1, where the arrow indicates the points between which this distance should be maintained.

The use of the brass pin to prevent contact between the armature and core should be maintained. An important point in this is that if the armature knocks against the pole piece it is liable to stick or freeze if not properly annealed. Another point is that the pounding of the armature against the core will cause it to harden. Its use is illustrated at *a* in Fig. 2.

The quality of the iron used should be of the lowest-grade carbon obtainable. For this purpose Norway or Swedish iron is the best. A lot of iron is being placed on the market as Norway, or low-grade carbon iron, but they are not as represented.

In many cases cold-rolled steel can be used if thoroughly annealed when the relays do not have to work on high resistance. Insulation for mounting springs should always be of high-grade hard rubber or mica, never fiber, and where terminals lead out of shell the same used. This is especially true where high resistance relays are used, because a slight leakage of current will cause the relay under some conditions to freeze or stick.

Fiber is porous to an extent and will allow moisture to creep into it. It is possible to use fiber in magneto switchboards, such as drops, but in common battery operations it is impossible to

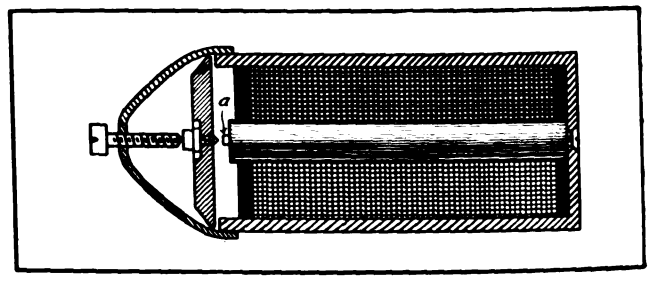

Fig. 2.

secure the high degree of insulation necessary to its successful operation.

Many people place a large amount of faith upon fiber insulation, but it is only necessary to make some tests to demonstrate its impracticability. Fiber can be dipped in hot beeswax and thoroughly boiled out—must be red fiber, not black. Black fiber is dyed, and in consequence is not as good an insulator as natural red color.

Drilling and finishing should be done before loading. It is immaterial whether it is done after mounting or before.

Beeswax is a better insulator than paraffine. Shellac is liable to crack off, besides being hard to handle and to get even results all around.

ELECTION RETURNS ON STREET CARS.

AN innovation in furnishing election returns was given a trial by the electric interurban railway companies entering Indianapolis during the evening following the recent election. The returns were telephoned by the officials of the companies to the conductors of the cars. They in turn read the bulletins to the passengers. As many of the lines are very long the through passengers appreciated the information, as otherwise it might have been hours before they could have learned the results of the election.

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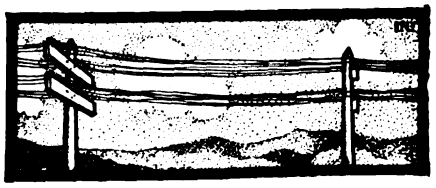
QUERIES

Questions on any subject relating to telephony will be answered on this page.



SELECTIVE SIGNALING.—(461.)

In the so-called Bell selective ringing system wired as shown. How can signal for *A* ring over and ring *X*? *a* and *b* are Jumper wires inside bell box. Is it not necessary to readjust the biasing springs of bells with every change in condition of ground where a rod is used; that is, if ground is frozen or otherwise good or bad? W. Y. O.

In reply to the first part of your query: This trouble may be caused through a high resistance path of ground return to the central office from *A*, the current flowing through the ground to *X* and back over that line. Suppose positive pulsations are sent out over line 2 to ring *A*, then line 1 is connected to ground

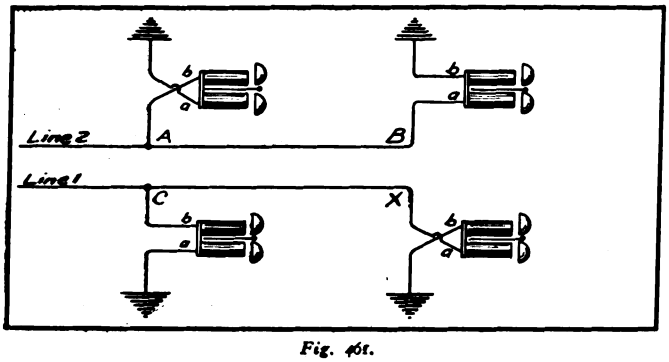


Fig. 461.

through the ringing key, then a condition as above suggested could occur. The same holds true for negative pulsations; in fact, for any combination for ringing any of the bells. The adjustment of the biasing spring is very important and requires a good deal of practice to secure the best results. As to readjustment of springs in cases where ground is liable to vary on account of weather conditions, it may be a slight help, but would require constant attention to give good results. Much the better way would be to sink the ground rod to a point below the ordinary level of frost or preferably to use a copper coil wire buried in coke and set as deep as possible in the ground.

PARTY LINE RINGING.—(462.)

We have a subscribers' line with ten stations on it. As it is we are able to ring fairly well all the parties. We have an opportunity to get six more subscribers further out than the line runs. Do you think we could extend the line to include them and ring the parties O. K., or shall we have to build a new line? Ringers of bells are 1600 ohms. T. & N. T.

Our suggestion would be to build a line which would be long enough to take in about eight of the present subscribers and then extend the old line to take care of the new subscribers and two of the old ones. In this way you may be able to save some wire. By this method you are able to reduce the number of parties on the present line, and in this way the signalling should be improved. On long party lines it is customary to use bells having a resistance of 2,500 ohms.

LOW-RESISTANCE DROPS.—(463.)

We have a number of country lines full metallic No. 12 B. B. iron wire from four to nine miles long and from one to nine telephones on a line. The instruments have 1600 ohm bells and four bar generators all bridging. The lines enter the board through 400 ohm bridging drops. The office has no trouble ringing subscribers and subscribers have no trouble ringing each other on the same line; but all have trouble to throw the drops of their respective lines. Can you suggest a remedy? O. C. S.

In all probability the trouble is caused by the drops being of low resistance and therefore have not enough ampere turns to energize the cores sufficiently to attract the armatures. The drops should have the same resistance as the bells, which in this case is 1,600 ohms, to afford the most efficient operation. It would be as well to look over all the connections to see that none are corroded or loose, as these troubles will cause high resistance, in which case not enough current would flow to sufficiently energize tne magnets.

TESTING WITH MIL-AMMETER.—(464.)

Will you please furnish diagram and information for measuring resistance with mil-ammeter. B. W. H.

It is impossible to measure resistances with mil-ammeter coil alone. A circuit for using mil-ammeter and voltmeter combined will be found in the previous issue of the JOURNAL, to which we refer you.

REWINDING GENERATOR ARMATURE.—(465.)

Will it make my generator stronger to put more wire on the armature, and if so, how shall it be put on? Must I take the wire off on one side and then put on what is necessary and then do the same with the other, or can I connect to the end of the coils now on and add sufficient to both sides? I need a stronger generator for country lines. G. J. R.

The size and amount of wire needed depends entirely upon the style of generator used, whether for series or bridging circuits. In either case it would be preferable to entirely rewind the armature, as it is doubtful whether you could add sufficient wire to help you. If you will let us know the type of generator you contemplate changing we may offer some suggestions.

ARRESTER GROUND.—(466.)

In a telephone plant where a common return is used and the return grounded at eight different placers throughout the system; is it all right to connect the ground wires of the lightning arrester on the telephones to the return wire instead of the ground? J. T. M.

The ground wire of a lightning arrester should be run in the shortest and most direct manner possible. It is obvious therefore that to connect it to the return ground is undesirable. Where it is impossible to secure a ground connection it might be permissible, but only as a last resort.

SIGNAL CIRCUIT.—(467.)

Please illustrate and describe a method of connecting up a drop to a jack so that when a plug is inserted in the jack the drop is disconnected from the line. P. T. S.

A circuit to fit your requirements necessitates the use of a jack which has spring contacts so arranged that the insertion of a plug will separate them. Fig. 467 illustrates such an arrangement. *B* and *C* are the tip and sleeve contacts respectively and

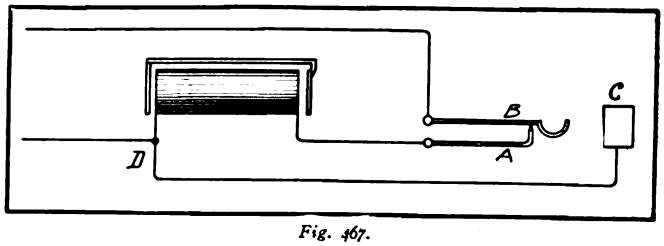


Fig. 467.

correspond to those parts of a plug. The normal circuit of the drop is from the subscriber's instrument to *D* through the drop to *A* and *B* and back over the other line. When a plug is inserted in the jack, the contacts *A* and *B* separate, leaving the drop circuit open; then the line is continued through to the cord circuit.

VOLTMETER TESTING.—(468.)

When a voltmeter is used for testing resistances what advantage is there by reducing the V. M. effective resistances with a shunt? If a voltmeter with a 30 volt range and 10,000 ohm resistance is shunted with a 200 resistance, what formula can be used for testing resistances and line faults? Are voltmeters reliable for capacity tests? B. H.

In the previous issue of the JOURNAL an article was printed which dealt exclusively with testing by means of a voltmeter, and to which we would refer you for reply to this query.

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A NEW FIELD FOR THE TELEPHONE.

IT is veraciously reported that a quarter of a century ago, when the telephone was first invented, an astute financier, when invited to participate in the securities of the new discovery, curtly replied that the telephone was unnecessary, as the district messenger boy was amply sufficient for the purpose. Such a prophecy would be now regarded with a smile, for the telephone has permeated almost every department of both business and social intercourse. In the factory it has displaced the speaking tube; in the hotel and department house it has replaced the annunciator and the hall boy, so that one has now to search for a new field of usefulness.

However, a few still remain, notably among them is the possibility of the use of the telephone on shipboard, and particularly on war vessels. Only little consideration is needed to show that here it would find a field of great importance. A large steamship of any description is an exceedingly intricate and complex piece of machinery, and it is at all times operated under circumstances which require the utmost vigilance from its officers, and the most prompt execution of orders to avert impending catastrophe. The tell-tales and telegraphs which are now in use as means of communication between the engine room and the bridge, or other parts of the vessel, are limited in scope, and are only adapted to transmit very restricted messages, and it almost goes without saying that if the captain and all officers were always within instant communication with each other, and that of an instructed nature, many accidents could be averted.

Heretofore telephonic installations upon shipboard have not realized the advantages that would seem to be inherent. Partly this has been due to the fact that it was necessary to use the telephone in a comparatively quiet location, as it was impossible to talk sufficiently loud to overcome the din in the engine room or the roar of battle; and partly because of an ultra conservative fear on the part of the steamship officers that the apparatus was likely to get out of order, and so fail upon perhaps a most momentous occasion.

Certain German manufacturers have recently devoted particular attention to such improvements of telephonic apparatus as will enable it to become serviceable under the most trying circumstances, even those of a naval engagement. In our last issue we described certain of these improvements, whose object is chiefly to provide such telephone circuits as will enable all stations upon the ship to simultaneously connect with all others, and to so install the necessary conductors that they, so far as human foresight can provide, shall be entirely immune from disarrangement, even under the most extreme conditions. Furthermore, particular pains are given to so designing the transmitters and receivers that the parties talking may be supplied with instruments that shall convey messages in a tone sufficiently loud to overcome any amount of extraneous noise, and finally to construct the apparatus in such a manner that it cannot be disarranged or thrown out of commission even by the concussion caused by the explosion of the largest guns.

To what extent these results have been achieved by the apparatus described can only be determined by experience; but we believe that sufficient progress has been made so that even a naval commander is amply warranted in installing a telephone system upon a war vessel, and, at least, applying it to the practical test of experience of a sham battle. If the apparatus now available, together with such refinements as the experience of the future will inevitably suggest, shall prove to be what is expected, a facility of almost incalculable value is placed in the hands of steamship officers, of which they will do well to avail themselves.

RECENT DEVELOPMENT IN MARINE INSTRUMENTS.

A LESSON OUT OF THE STORM.

THE recent storm which swept across the Atlantic seaboard demonstrated in a most graphic way the necessity of suitable line construction. Up through the New England States the damage done to telephone poles and wires was something enormous. In one locality along the line of the Canadian Pacific Railway, near Vanceborough, Me., for twenty miles every telephone and telegraph pole was blown down by the furious gale, and for almost a week telephonic and telegraphic communication was cut off from a large number of towns and villages throughout the State of Maine. A rough estimate of the damage done would not be far short of $250,000, but this does not account for the loss of business to the telephone and telegraph companies.

The development of the telephone and telegraph has been such that a single pair of conductors is being used to convey anywhere from two to six different messages simultaneously. The working of composite lines composed of telephone and telegraph circuits brings in a large revenue to telephone companies, and when for any reason this service is cut off a great financial loss occurs.

From this it is clear that the attention paid to an aerial plant should be greater than to any other part of the system, since it alone has to withstand the elements.

The very best solution of the problems incident to the operation and maintenance of line plants is the substitution of underground distribution for aerial wherever possible. The construction of underground systems may involve a greater outlay at the start, and in the case of long distance circuits it is generally impracticable, yet the time is not far distant when the aerial wire line will be a thing of the past. In European countries underground long-distance circuits are quite common. In England the general post-office department has built a subway from London to Manchester, and is extending it to towns much farther north. While the present consideration of underground construction for long-distance lines is out of the question it is well to consider the engineering details which should be carried out in the construction of an aerial plant that is going to withstand the ravages of wind, rain, snow and time. Many long-distance companies employ for this branch of the business poles which are stout enough to carry 100 wires and which are not more than 25 feet high. By using such solid construction the maintenance upon a long-distance trunk line is very materially reduced, and although the initial cost of such heavy poles may be considerably greater than the ordinary pole of a similar height, yet it would be more economical in long lines to use timber which is of a substantial character. When a pole line goes down it does so nearly always at an inopportune moment, when it is difficult to be replaced, and then the delay in closing the circuits causes a great financial loss. It is therefore evident that the operation of long-distance lines necessitates a thorough understanding of the principles which underly outside construction.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and

RENTAL OF TELEPHONES.

Several years ago we made an agreement with one of our subscribers by which we were to lease him the use of a telephone wire for two years at a rent payable quarterly. After the expiration of the two years we continued the arrangement by mutual consent. Telephone rates afterwards went up and on the last day of the quarter we gave him a notice ending the agreement at once, stating our intention to discontinue the wire and remove the apparatus and at the same time demanded the rent up to the 1st of the month. This was really a mistake on our part because the quarter ended on the 30th of the month. He paid the rent. Now he brings an injunction to restrain us from taking out the apparatus. Has he a good case?

N. C. T.

WE think his chance of getting an injunction is good. The relation between a telephone company and its subscriber is that of landlord and tenant. His tenancy was from year to year, and the acceptance by you of the rent beyond the end of the year, even though it was only a day's rent, renewed the agreement for another year. It also nullified the effect of the notice that you had previously given. See Joyce on Electric Law, Section 1027.

DELIVERY OF TELEPHONE MESSAGES.

Is a telephone company under the same duty to deliver messages intrusted to it as a telegraph company is? Please explain the law on this point.

G. L.

TELEPHONE companies, so far as this feature of their business is concerned, are held to the same degree of diligence and are as strictly liable for the non-performance of their duty as are telegraph companies. If the telephone message shows its importance and is to be sent to an addressee in care of another, the company is negligent if, without inquiry when sendee is there, it delivers it to a person of the same surname but a different Christian name from the one in whose care the message is in, when the latter is shown by the directory to be within two blocks of the company's office, and in said directory said name is connected with that of the sendee. Martin vs. Sunset Telephone Company, 18 Wash. 260, 51 Pac. 376. This case shows that it is the duty of a telephone company as well as of a telegraph company to make due inquiry and to exercise reasonable diligence at least to find the person to whom the message is intended to be delivered and to deliver it to him.

EXCLUSIVE RIGHT TO SUBWAYS.

IT is a general rule that the individual cannot maintain a suit in equity to restrain the violation of a statute enacted for the protection of the public, unless he shows that he has been or will be injured in person or property by the violation of the statute. It must be shown that the plaintiff has sustained or will sustain special damage. This rule is applicable to private corporations as well as to individuals.

This was the ruling in an action by an electrical subway company to enjoin a cable railroad company from maintaining electrical wires in the cable conduit, or using any electric conductors not placed in plaintiff's subways. The right of constructing subways in certain streets and of leasing space therein to persons operating electric conductors had been granted to the Electric Company. The court would not permit the Subway Company to enpoin the maintenance of electrical wires in such street, not placed in its subways in violation of the laws relative to electric conductors, unless complainant company had an exclusive right to have all electrical conductors placed in its subways either by contract or by statute.

Taking up this question the court held that the contract between the city and the Subway Company by which the city granted to the company the right to construct subways in the streets, and providing that the contract should be without prejudice to the rights of the city to enter into other similar contracts and that nothing in the contract should be construed as granting any exclusive right. The application for an injunction was therefore overruled.

Empire City Subway Company vs. Broadway and S. A. R. Company, 33 N. Y. S. 1055.

AGENT'S ADMISSION BINDING ON PRINCIPAL.

A SUIT for damages was brought by one Prince against the Texas and Pacific Telephone Company, the damages being alleged to have been sustained by him as a result of a fall occasioned by becoming entangled in a wire negligently left in the streets of the town by the defendant. Plaintiff alleged that while endeavoring to break the force of the fall he cut his thumb, causing the joint to become stiff, which thereby permanently incapacitated him from pursuing his occupation as a saddle and harness maker. Defendant demurred generally and specially, and in addition to the general denial pleaded contributory negligence. A trial resulted in a verdict in favor of the plaintiff for $450. The company alleged that the wire was left in the streets by some other person and that the negligence, if any existed, was attributable to the town and not to the telephone company. Evidence showed, however, that the local manager of the telephone company, when shown the wire, said: "That is our wire." The court overruled the assignment of error based upon this defense.

Another matter of defense was that agent of the telephone company had no authority to bind the company by his admission. It was shown in evidence, however, that he presented and collected bills of account for the company, had charge of the construction and repair of its lines and acted for the company in regard to the action. The court held that the evidence showed that the local manager was clothed with such power and authority as rendered his declaration admissible.

Another assignment of error was the failure of the court to submit to the jury the question of plaintiff's contributory negligence. The court concluded that there was no evidence of contributory negligence and said in relation thereto: "It certainly cannot be affirmed that the party is guilty of negligence because of the mere failure to closely scrutinize the sidewalks of the city." Texas Pacific Telephone Company vs. Prince, 82 S. W. 327.

BACK-TAX PETITION.

SUIT against the American Bell Telephone Company for back taxes for five years, aggregating $250,000, has been filed by the State Revenue Agent at Lexington, Ky.

The petition alleges that the company, which was created under the laws of the State of Massachusetts, was the owner at the time stated in the petition of certain personal property in Fayette county, Kentucky, consisting of telephone lines, leases and telephone instruments valued at $50,000. It further alleges that this amount was omitted from assessment and taxation for the years of 1899, 1900, 1901, 102 and 1903, and is still omitted, the defendant company failing and refusing to list this property for taxation for all of these years. The plaintiff prays that the property be now assessed as above mentioned and 20 per cent. still be added as penalty. The taxes claimed to be due on the property will amount to $3,000.

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IN THE OPERATING FIELD.

INDEPENDENT ASSOCIATION OF WISCONSIN TO HOLD MEETING.

THE next annual convention of the Independent Telephone Association of Wisconsin will be held at Milwaukee on January 25 and 26. Owing to the importance of telephone matters that are to be considered the meeting has been called a month earlier than usual. The headquarters and meetings will be at the Pfister Hotel. A large attendance is expected.

BELL RATES IN SALT LAKE CITY TOO HIGH.

THE Business Men's Association of Salt Lake City, Utah, is making an effort to relieve its members and the public generally from the extortionately high rates charged by the Bell Company. At a recent meeting a commitee was appointed to investigate the matter and to conduct a campaign with a view to securing all the business and professional men of the city to join the association. The committee is as follows:

H. S. Joseph, chairman; A. Hudson, E. E. Rich, J. L. Franken, Samuel Weitz, Jacob Moritz, C. N. Strevell, C. J. Crabtree, G. F. Strickley, Eber W. Hall, Maurice J. Friedman, N. B. Roberts, A. H. Kelly, B. F. Redman, N. B. Campbell, Dr. S. C. Baldwin and Steven H. Love.

Several sub-committee were also appointed to secure information as to rates charged in other cities, and to confer with the management of the telephone company.

CONSOLIDATION OF ILLINOIS COMPANIES.

THE Farm and City Telephone Company, of Clinton, Ill., has sold its entire system to the National Telephone and Electric Company. This company has also bought the Farmers' Interstate Telephone System, and has consolidated these two companies into one with B. F. Wasson, of Clinton, Ill., president, and S. H. Martin, of Waynesville, Ill., secretary and treasurer. The new company has increased the capital stock from $50,000 to $100,000, all of which has been sold. It will put up 16,000 feet of cable this fall and add such other improvements as the business necessitates.

Besides reaching into six counties of the corn belt in Illinois it has connections with all the towns in the center of the State, and will soon be connected with the Interstate Telephone Company, which will give it toll service to all the principal cities from Chicago to St. Louis and Kansas City.

PORT ARTHUR'S RESERVE INCREASING.

THE municipal telephone plant established several years ago by the town of Port Arthur, Ont., for public service in opposition to the Bell plant at that point, is continually adding to its number of subscribers, and also rapidly increasing its reserve or surplus fund, as will be seen from their statement, as appeared in the November issue of the *Railway and Shipping World*, of Toronto, Can., which is as follows: "The Port Arthur, Ont., municipal telephone plant earned as gross income for the half year ended June 30, $2,679; the operating expenses were $1,783, and the interest charges $450, leaving a surplus of $446. For the year 1903 the total earnings were $3,774 and the surplus $419. The amount of telephone debentures outstanding is $21,000, bearing 5 per cent. interest, and of this amount $12,000 is being offered by the Dominion Securities Corporation, Toronto, at 101 and accrued interest. The telephone plant was installed November, 1902, and in September there were 433 subscribers, of whom 199 were for business telephones and 284 for instruments in private houses. The system is a central energy one, and free connection is given to Fort William. The rates are $12 for instruments in private houses and $24 for business places."

The municipality, when starting the service, aimed to arrange their charge of rentals so as to place the plant upon a purely maintenance basis. This was done that subscribers to the service would not be required to contribute into the city treasury to the benefit of the tax-payers of the town who were not subscribers, and vice versa. From the statement given above, showing that the surplus for the first six months of the present year was more than for the entire year previous, it can be seen that their estimates have included sufficient for almost any emergency. The outside construction of the system having most of its heavy leads in lead-covered cables and the equipment being of the "International" central energy lamp signal type, which is considered one of the most economical and durable telephone systems to maintain, the plants will require the setting aside of a very small percentage for depreciation.

LONG DISTANCE CONNECTION FOR HULL COMPANY OF NEODESHA, KAS.

THE Hull Telephone Company, of Neodesha, Kansas, has recently completed a long distance traffic agreement with the Western Independent Telephone Company, which is building a line from Kansas City to Cherryvale. When this line is completed the subscribers to the Hull system will have long distance connections with Iowa, Indiana, Illinois, Ohio and Missouri.

In Kansas City the connection will be made with the Home Telephone Co., which has 22,000 telephones in that city against 15,000 on the Bell system.

FIRST INDEPENDENT LINE INTO CINCINNATI.

THE first message over an Independent telephone line from Cincinnati was sent to Kentucky recently over the Kineon lines, after much litigation. The message was sent from the Kineon offices on East Fourth street to Butler, Ky., to which point the Independent telephone lines of Kentucky extend, connecting with the Homer Telephone Company, of Louisville. The circuit extends from the Kineon offices over the Central Bridge to Newport, thence over housetops to Covington, where the Merchants' Police franchise is owned by Kineon, thence southward through Visalia, Kenton, Morning View and the Government rifle range. About the time the messages were being sent to and from Cincinnati and Kentucky towns, Judge Shaw issued an order directing the Merchants' Police and District Telegraph Company to show cause why it should not be punished for contempt.

THE UNION COMPANY, OF DAVENPORT, TO CONNECT WITH THE INTERSTATE.

WITHIN a few weeks the Union Electric Telephone Company will connect at East Moline, Iowa, with the Interstate Company, which is at present constructing a line from Galesburg to Sterling. A spur will be run from the main line to East Moline, which will give the Interstate Company connection with the tri-cities.

At present a large gang of workmen is being employed between Watertown and Rose Hill, and the poles are all in place between Hillsdale and these points. It is understood that an-

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other gang is working east from Hillsdale and that the line will soon be completed to Sterling.

The Interstate Company has exchanges at Peoria, Galesburg and in nearly every town and city in the eastern part of the State.

The Union Electric Company, of Davenport, Iowa, has made an agreement with the Crescent Telephone Company of the east end of the county for free exchange. Under this arrangement nearly 500 subscribers in the eastern end of this county and from various points in Whiteside county will have free exchange with the telephone patrons in the tri-cities.

OPEN WIRELESS IN DES MOINES.

THE reconstruction of the Des Moines Mutual Telephone Company's plant on the "open wireless," or all cable, system is progressing rapidly under the engineering supervision of Mr. C. H. Judson. The company has erected a fine fireproof building for its central office and a new lamp-signal central-energy switchboard of 9,600 lines capacity is about completed. All open wires throughout the entire city will be taken down and everything put into cable, something like 300,000 feet of cable being used, 5,000 pairs of conductors entering the two exchanges.

The Mutual Telephone Company is in a very prosperous condition and is taking between 200 and 300 contracts a month for installation as soon as the new plant is completed. Its toll-line connections are exceptionally good, some thirty-six circuits at present radiating in all directions and connecting with the entire Independent system of the State.

LONG-DISTANCE LINE FROM PITTSBURG TO WHEELING.

THE long-distance line of the Pittsburg and Allegheny Telephone Co. to Wheeling is being pushed rapidly to completion. This line will connect the P. & A. system with Independent telephones in Northern Pennsylvania, reaching the principal towns, such as Warren, Girard, and Titusville. This line, together with the one to Johnstown, will give unequaled telephone facilities to the towns of Western Pennsylvania, and will besides afford long distance connection to towns and cities in Ohio, Indiana, Virgina and Maryland.

HOME COMPANY OF KANSAS CITY BUYS STOCK OF WESTERN INDEPENDENT COMPANY.

THE Kansas City Home Telephone Company has purchased all of the stock of the Western Independent Telephone Company, which company owned the long-distance toll line out of Kansas City. The deal has been consummated and the Kansas City Home Telephone Company now owns and controls both the Home plant and the long-distance lines. The Kansas City Home Telephone Company now has over 10,000 telephones in operation, and is increasing its list rapidly. At the present time the traffic reports show an average of 2,000 calls each twenty-four hours.

ELYRIA PLANT MAKES IMPROVEMENT.

THE Elyria (Ohio) Telephone Company is just completing its new multiple tap cable system of distribution. Several thousand feet of underground cable has been drawn into the conduits, and over one hundred thousand feet of aerial cable put up, and a new common battery multiple switchboard has been installed. It is the company's intention to furnish all classes of service, such as individual and party lines and measured service, so as to meet all requirements of office and residence subscribers. The engineering and management of the plant is under the supervision of Leroy W. Stanton, consulting and constructing engineer, of Cleveland and Chicago. Mr. Stanton is rebuilding a number of plants and taking up the management and engineering details with a view to increasing the earning capacities of the plants. By reorganization of the various departments and a thorough system of records and reports he is able to keep a close check upon the cost of maintenance and operation.

The system of accounting is one devised by F. H. McPherson, chartered accountant under the Canadian Government, and McSanton. By means of a thorough analysis of the various systems of bookkeeping employed by Independent companies they have been enabled to devise a system which gives clear and concise information. By an agreement with the owners of the plants the managers under Mr. Stanton's supervision are promoted as they prove themselves capable. In this way the owners as well as the men are benefited and opportunities are opened for advancement to the industrious men.

TELEPHONE PROGRESS IN NEW ZEALAND.

A RECENT report of the Postmaster General and Electric Telegraph Commissioner for New Zealand gives some interesting facts of the development of the telephone systems in the two islands.

In 1903 there were 1,161 kilometers of telephone lines, consisting of 15,823 kilometers of wire. There were 2,103 subscribers in Wellington; 1,707 in Auckland; 1,579 in Dunedin; 1,479 in Christchurch; 425 in Wanganui; 334 in Napier; 335 in Invercargill; and 320 in New Plymouth. Besides these there are about four other places with between 200 and 300 subscribers; nine with 100-200; six with 50-100; and 53 with less than 50.

Up to April 1, 1904, £1,053,692 was paid by the Treasury for the construction of telegraph and telephone lines, and the following figures show the progress of the telephone service:

	Capital expenditure.	Receipts.	Expenses.	Balance.
1900.....	£162,333	43,303	46,567	— 3,264
1901.....	£176,349	49,117	45,348	+ 3,769
1902.....	£193,512	55,542	50,772	+ 4,770
1903.....	£213,966	62,151	56,277	+ 5,874
1904.....	£241,903	72,028	60,948	+ 10,080

The construction of rural lines for farming communities is being investigated, and in all probability the development in the next year will greatly exceed any that has occurred in the past.

THE COHOES AND WATERFORD HOME COMPANY PROSPEROUS.

THE Cohoes and Waterford Home Telephone Company is meeting with much success in those cities, a large number of subscribers having been added to the list within the past several months. The line plant consists of underground conduit and cable work in the business district, large enough to accommodate a capacity of 3,600 telephones with an overhead construction for aerial cables.

The company has now under contract in Cohoes and Waterford 750 telephones and is placing new instruments daily.

LETTER FROM C. H. JUDSON.

THE following letter has been received from Mr. C. H. Judson in reference to a notice given him in a recent issue:

"*Editor of* THE AMERICAN TELEPHONE JOURNAL:

"In your issue of November 19th, under the head, "The Mutual Telephone Company of Des Moines Extends Its System," you state that I have been secured to look after the business of the company. Permit me to make the correction that I have been secured simply to construct the plant for the company in the capacity of engineer. You also state that the immense subscription list of the Kansas City Home Company was the result of my efforts; in justice to the gentlemen who have made the Kansas City Home Company what it is, permit me to say that during my brief connection with this company my work was altogether in other lines and had nothing whatever to do with the subscription list."

"C. H. JUDSON."

It appears we were in error and take this opportunity of correcting the statement.

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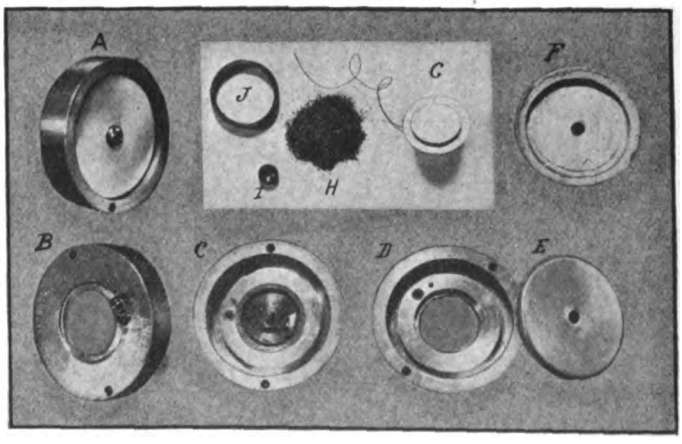
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A NOVEL TRANSMITTER.

THE Fahnestock Transmitter Company is placing upon the market a form of transmitter which, in its mechanical details and execution, is a decided novelty. The original White Transmitter received the appellation of "The Solid-Back," in contradistinction to the old Blake instrument; because in the White one carbon electrode was mounted immovably against a metal bar or bridge, and, compared to the spring contact of the Blake transmitter the White was indeed a "solid-back." But the present design of the Fahnestock instrument might be called the "solid-back of solid-backs," for the instrument is built in the form of an exceedingly heavy and rigid metallic capsule. The entire transmitter is shown at *A*, and seemingly consists of a round disc of metal about two inches in diameter and half an inch thick. Upon one side appears an aluminum diaphragm secured to a central stud. The back of the metal block contains, as is shown at *B* in our illustration, a screw, to which one electrode may be attached, while the other is secured to any part of the case. If the aluminum diaphragm be removed, as is shown at *C*, the interior mechanism is displayed. The metal block is composed of a peculiar composition, which can be cast closely to shape, needing but the slightest amount of trimming in the lathe. As is indicated at *C*, the face of the disc is surfaced and a deep groove cut near the circumference, while the center is hollowed for the purpose of receiving the granular carbon. At the bottom of the central cavity a carbon electrode is placed, as is shown at *D*, then the granular carbon *H* is introduced, and the front electrode, which is clamped to a mica diaphragm by means of a brass nut, is placed on top of the carbon, retaining it in position. The mica diaphragm is then secured in place by the brass ring *J*, which is pressed into the cavity and holds the diaphragm firmly against a ledge, which may be seen at *D*. Then the aluminum diaphragm, shown at *E* and *F* is placed over the central stud, which projects through the mica diaphragm and is held in place by the brass nut *I*. From this construction it will be seen that the instrument is exceedingly substantial, the rear electrode being solidly supported by the entire disc that forms the frame work.



Parts of Fahnestock Transmitter.

The aluminum diaphragm is made as light and as thin as possible, and as, as will be seen, is supported simply upon the stud through its center; consequently this diaphragm is freerer to move than is possible with any form of transmitter holding the diaphragm by its circumference, with the electrode attached to its center. Thus it seems probable that the vibration of this diaphragm will more faithfully represent sound waves than would be the case in other types. As the metallic capsule contains the entire transmitter mechanism, it is a complete unit of itself and may be placed in any kind of a case, with or without a mouthpiece, according to the fancy of the user; in fact, all that is necessary is to attach one of the capsules to a bit of flexible cord, and one may talk over any telephone line.

THE FARR TELEPHONE AND CONSTRUCTION SUPPLY COMPANY, of 118 and 120 W. Jackson boulevard, Chicago, has issued a new catalogue, No. 17, which it aptly styles a book of information. Descriptions are given of almost every article necessary in the construction and operation of a system, each article being illustrated and thoroughly described. All types of instruments for magneto systems are portrayed and indexed in such a manner as to be readily located for future reference. Among the pieces of apparatus described are magnetos, ringers, transmitters, receivers, switchboards for exchanges, toll and rural lines, backboards, drops, annunciators, hooks, induction coils, plugs, jacks, terminals for aerial lines, fuses, arresters, switches and batteries. In construction material almost every appliance known to the trade is listed, including tools, insulators, pins, brackets, bolts, braces, cables, wire, etc. Diagrams are furnished for connecting up various types of instruments, also for making transpositions and connecting up repeating coils. The volume concludes with some tables and some instructions for building farmers' lines.

THE MONARCH TELEPHONE MANUFACTURING COMPANY, 14 So. Clinton street, Chicago, reports a large and increasing business in its compact type telephones. This class of instrument embodies many admirable features in construction and is so designed as to allow all of the parts being readily removed without disturbing the permanent wiring. Especial attention has been given to the design of bells and generators for heavily loaded lines, and the transmitters and receivers are the equal of any on the market. To those managers looking for the right article at the right price the company recommends this instrument. Descriptive matter and prices will be mailed upon request. This company also manufactures a number of different telephone and construction specialties which it would be well for exchange managers and operators to know about. It has unequalled facilities for filling orders promptly and will be pleased to hear from all parties interested.

THE BAIRD MANUFACTURING CO., 4 Michigan street, Chicago, Ill., have received a letter from a customer in the Southwest which illustrates in very strong language one of the features of Baird pay stations. They lost the combination card of the pay station, and therefore, of course, could not open it. Part of the letter is herewith reprinted:

"We are unable to open this pay station, and have had no advice from your company as to the combination. If this is the manner in which you wish to impress upon your customers that your machines are burglar proof, I will say that we are convinced. Nothing short of an axe, sledge hammer or the combination to the lock would, in our judgment, open it. Therefore please send us the full directions at once to open it up."

Telephone companies who are using pay stations which they do not feel will withstand the wiles of a thief might take the above as a good hint as to where they can get pay stations which will turn over to them all the money that is put into them. The company will furnish full particulars on request.

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

EXCEPTIONAL offer—I have a three-fourths interest in a telephone stock company owning four good exchanges and 1,000 miles of toll and farmer lines. About 1,000 telephones in operation and sufficient territory for that many more. Stock outstanding amounts to $50,000. Has earned over 30 per cent. in past two years. No competition; $25,000 cash and balance long time; low rate. Address Box 291, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 291

FOR SALE—10,000 chestnut telephone poles in lengths from 25 ft. to 75 ft. Address E. F. Collins, 603 Ann street, Parkersburg, W. Va. 292

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—A good man for instrument work, who can also run wiring for electric lights. Address Box 287, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 287

WANTED—First-class wire chief; magneto and central energy. Must fully understand installing multiple switchboards, etc. Address Box 288, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 288

WANTED—Position with telephone company. I am an expert lineman and repair man; three years' experience; best of references furnished. Address P. O. Box 591, Toledo, Tama County, Iowa. 278

WANTED—Position as manager or superintendent of Independent exchange. Am temperate, married, and have had four years' practical experience. Address Box 273, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 273

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—Position as superintendent of a large exchange or manager of a plant, 1,000 telephones or less. Have had ten years' experience in all branches of the business. At present am superintendent of an exchange in a city of 175,000 population. Open January 1st to any company that wants a hustler. Address Box 286, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 286

WANTED—Position as manager with a first-class company looking for a hustler. Experienced particularly in toll and long distance work, including clearing house methods, and line construction. Familiar with every detail of telephone work. Executive ability; excellent references. Address Box 285, care THE AMERICAN TELEPHONE JOURNAL, New York. 285

Cyclopedia of Applied Electricity

Five volumes, 2,500 pages, 8 x 10 inches in size. ¼ Morocco Binding. 2,000 illustrations. Fully indexed. Regular price, $30.00.

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We are printing an edition for our own use. By increasing the edition we can make a great saving in cost of manufacture. We are willing to share this saving with those who will place advance orders **immediately.** The regular price is $30.00. We will distribute 1,000 extra sets at the reduced cost of manufacture **while they last.**

$2.50 Paid Now secures this $30.00 Cyclopedia for less than half-price—$ 2.50—delivered, express prepaid. The full set of five volumes will be delivered to you as soon as it is off the press. Cut out the coupon below and mail to us. No further payments need be made until February 1st, when payment of balance at the rate of $2.00 per month must begin. **Order immediately.**

Books will be sent by express, prepaid, and may be returned at our expense if not entirely satisfactory.

Some of the Writers:

PROF. F. B. CROCKER, head of Department of Electrical Engineering, Columbia University.
PROF. WILLIAM ESTY, head of the Department of Electrical Engineering, Lehigh University.
H. C. CUSHING, Jr., Wiring Expert and Consulting Engineer, New York.
PROF. GEORGE C. SHAAD, University of Wisconsin.
J. R. CRAVATH, Western Editor of the Street Railway Journal.
CHAS. THOM, Chief of Quadruplex Department, W. U. Tel Co.
WILLIAM BOYRER, Telephone Expert and Consulting Engineer.
PROF. LOUIS DERR, Massachusetts Institute of Technology.

Partial Table of Contents:

VOL. I.—Electric Current; Measurements; Wiring; Telegraphy; Wireless Telegraphy.

VOL. II.—Theory of Dynamo-Electric Machinery; Direct Current Dynamos; Direct Current Motors; Storage Batteries.

VOL. III.—Electric Lighting; Railways; Management of Dynamo-Electric Machinery; Power Stations.

VOL. IV.—Alternating Current Machinery; Power Transmission.

VOL. V.—Telephony; Distribution; Construction; Cables; Cross Talk; Telephone Exchanges; Switchboards; Exchange Wiring; Operation; Maintenance; Common **Battery** System; Automatic **Telephony;** Systems; Faults; **Testing.**

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It is understood that I may return the set at your expense within five days and that you will refund the amount paid. Also that you will return the $2.50 if my order is received too late.

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St. Address.....

City..... State.....

AM. TEL. JOURNAL, DECEMBER 3.

American School of Correspondence

At Armour Institute of Technology

CHICAGO, ILL.

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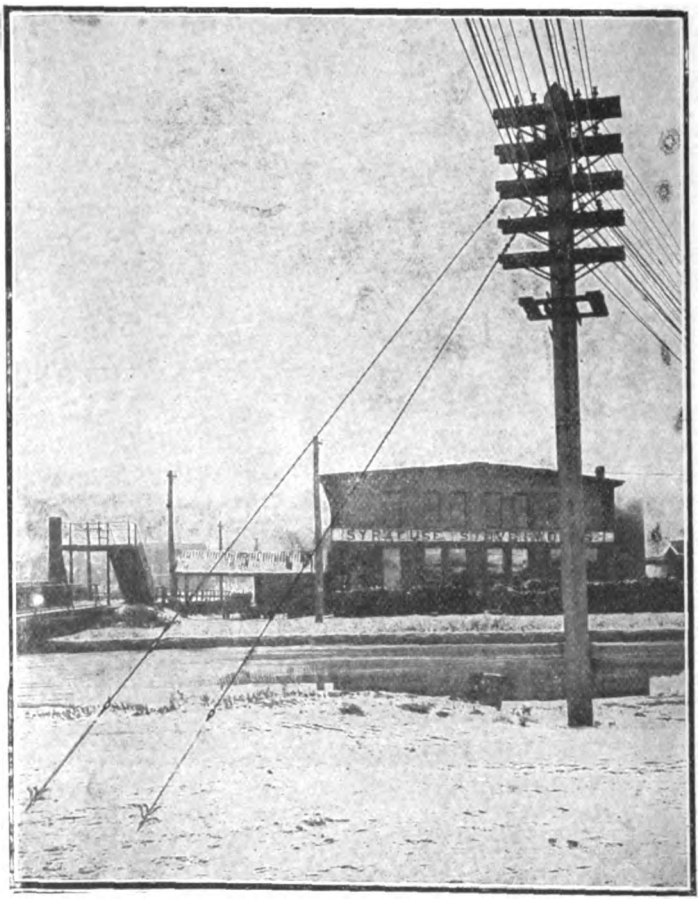
IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS."

HARPOON GUY ANCHOR.

AN Anchor for guying telephone, telegraph and electric light and trolley wire poles, recently put upon the market, is that made by the Crouse-Hinds Company, of Syracuse, N. Y.

This Anchor is designed to take the place of the so-called "dead man" or "slug" and also to get rid of the trouble and expense met with in installing other kinds of Anchors. The method of installing is simple, as will be seen by the accompanying illustration. While the lineman is tieing the guy wire to the pole, the ground man makes a hole about 2½" deep by 4" in diameter with a digging bar, at the same angle that the guy will run. Placing the Anchor in the hole, he drives full length with an ordinary 12-pound sledge. The Anchor is then pulled out, by attaching it to the guy, until the wings spread, or about 6". The installation is now complete and the Anchor is ready for the guy.



Illustrating Use of Harpoon Guy Anchor.

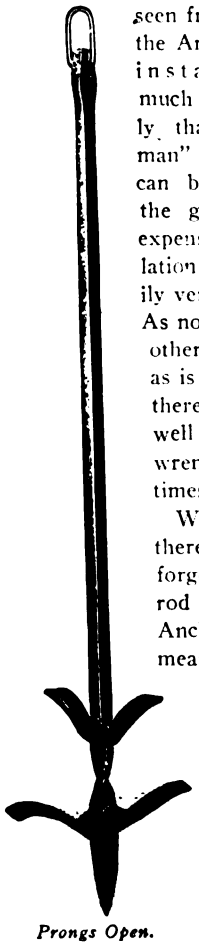
It can be readily seen from this that the Anchor can be installed very much more quickly than a "dead man" or "slug" can be placed in the ground. The expense of installation is necessarily very much less. As no wrenches or other special tools are required to install this Anchor, as is the case with every other Anchor on the market, there are none to be broken or replaced. It is a fact well known by those who have used augers and wrenches that they readily break and that oftentimes it is impossible to dig a hole with an auger.

With the Crouse-Hinds Harpoon Guy Anchor there are no tools to break. The Anchor is made of forged steel and is practically indestructible. The rod is 5 feet long and 1 inch square and the complete Anchor weighs 22 pounds. As the wings closed measure but 4" at the widest point, they do not prevent the Anchor being readily driven into the ground, and as they have a spread of 13" when open it would consequently be a matter of considerable difficulty to get the Anchor out of the ground after the wings are once spread.

In ordinary ground from 10 to 40 blows of the sledge are sufficient to install the Anchor. It will, however, go into any kind of wet, dry or frozen soil. It can be installed in many places where it is not possible to dig up the ground to bury a "dead man" or "slug," such as in a private lawn.

Before this Anchor was put upon the market, the manufacturers did considerable experimenting with very favorable results. Since then a number of telephone and electric light companies have tried it and report that it is in every way an entire success.

The Crouse-Hinds Company, Syracuse, N. Y., will gladly send specifications and prices to anyone interested.



Prongs Open.

Prongs Closed.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, it is said, is having a heavy demand for its new self-restoring drop switchboard, with the "never-failing" restoring device, and for its long-distance telephones. Among its recent shipments were switchboard equipments for Urbana Telephone Co., Urbana, Ind.; Mankato Citizens' Telephone Co., Mankato, Minn.; Wilmot Mutual Telephone Co., Cromwell, Ind.; Hackeman & Schroder, Jacksonville, Fla.; Rush Hill Telephone Co., Rush Hill, Mo.; Union Telephone Co., Divernon, Ill.; South Wayne Telephone Co., South Wayne, Wis.; Summitville Telephone Co., Summitville, Ind., and Jefferson County Telephone Co., Fort Atkinson, Wis.

THE BAIRD MANUFACTURING CO., 4 Michigan street, Chicago, gets letters every week from distant parts of the earth telling of the successful working of its pay-stations, and what a financial surprise they are. It is so much easier for all concerned to let the subscriber pay for what he gets, and let the telephone company have cash in the box for the service. If you don't believe it let the Baird Company send you a pay-station on trial.

FRANK B. COOK, besides getting an order for 8,000 pairs of his No. 444 Protector for the Citizens' Telephone Co., of Columbus, Ohio, has received the following orders for this popular type of Self-Soldering Protectors: La Harpe Telephone Co., La Harpe, Ill., 200 pairs; United Telegraph and Telephone Co., for their exchange at Newport, Pa.; a type L-3 frame of 100 pairs capacity equipped with 50 pairs; for their Littletown, Pa., Exchange, type L-3 frame, 100 pairs capacity, equipped with 50 pairs; Mangum Telephone Co., Mangum, O. T., type L frame, 300 pairs capacity, equipped with 260 pairs; Suburban Telephone Co., Ferguson, Mo., an addition of 60 pairs;

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INSIDE WIRING PROBLEMS SOLVED

"Style A."
(Exact Size.)

For Twin or Parallel Wires.
Price $4.30 per 1000.

One screw in each cleat for twisted pair wires. When once installed, you are through with them. They never break, split, or come off. They are perfect insulators. Smaller and neater than any other cleat.

Style "C."
(Exact Size)

For Corners.
Price $4.00 per 1000.

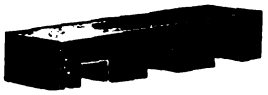
The Morris Hard Fibre Cleats

Style "B."
(Exact Size.)

For Twisted Pairs.
Price $4 50 per 1000.

harmonize with the wood-work and surroundings in the most beautiful office or residence. Their use enables you to make a really neat, and almost invisible job of wiring. And there will be no complaints from subscribers.

"Style D."
(Exact Size.)



For Three Wires.
Price $6.50 per 1000.

Cheaper Than All Others, Too **Let Us Have a Sample Order**

THE MORRIS ELECTRIC CO.,

Manufacturers of Fibre for . . Electrical Purposes . .

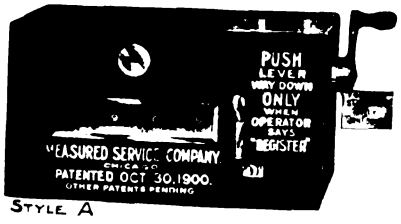
FOURTH AND SHIPLEY STREETS - - WILMINGTON, DEL.

UP WITH THE DIVIDENDS!

Dividends are what you are looking for

Flat Rate Won't Make Them—MEASURED SERVICE WILL

The measured service meter which records *both* at central and at subscriber's end. : : :

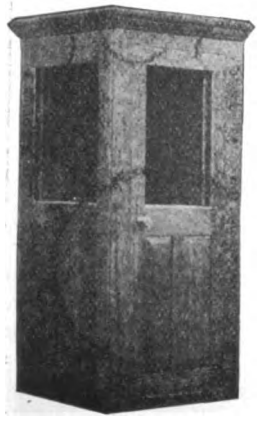


STYLE A

The subscriber cannot dispute when he does his own recording. *Collectors abolished.* : :

Don't fail to investigate our meters at the Interstate Convention

Measured Service Company, 153-159 So. Jefferson St. **CHICAGO**



We start Right by having a complete equipment for Drying the Lumber from which we make our

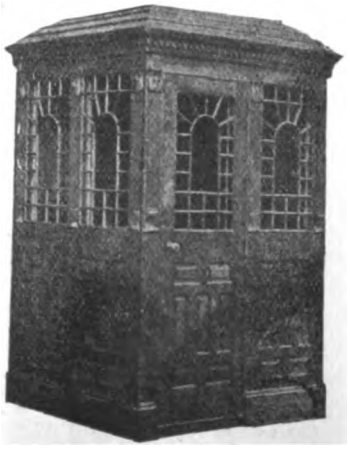
Sound-Proof Booths

and then every detail of manufacture is carefully watched and handled by experienced men.

That's why ours are so satisfactory.

Why haven't you our catalogue? It's free for the asking, and prices, too. Now's the time to write.

YESBERA MANUFACTURING CO., Toledo, Ohio



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E. Ritter, Marked Tree, Ark., 100 pairs; Kellogg Switchboard & Supply Co., for the Telephone Exchange at Freeburg, Ill., 100 pairs; Scott Co. Telephone System, Oran, Mo., type L-3 frame, 100 pairs capacity, equipped with 60 pairs; Northeastern Telephone Co., an addition to the Lewiston, Me., Exchange, 150 pairs. Cook has also received an order from the from the Eastern Telephone Mfg. Co. for the exchange it is installing at Union, N. Y., for the York State Telephone Co. This order was for a type L frame of 300 capacity, equipped with 60 pairs of No. 444.

ENGINEERS OF DEAN ELECTRIC COMPANY.

IN the formation of the Dean Electric Company, of Elyria, Ohio, Mr. Dean associated with himself for the direction of its engineering department three young men who have already made names for themselves in the field of telephone engineering and literature. Ray H. Manson is a graduate of the University of Maine, class of '98, receiving a degree of Electrical Engineer from that institution. In 1899 he accepted a position with the Western Electric Company of Chicago, which he held for about two years, during which time he worked in the factory, shop office and telephone laboratory. He next allied himself with the Kellogg Switchboard & Supply Company as assistant to W. W. Dean in its experimental laboratory, and later served in its engineering department and as sales engineer.

Ray H. Manson, of the Dean Electric Company.

When the Dean Electric Company was formed the position as assistant to Mr. W. W. Dean in engineering and experimental work was offered to him, which post he now holds. He is an Associate Member of the American Institute of Electrical Engineers.

Albion D. T. Libby, of the Dean Electric Company.

Albion D. T. Libby is a graduate of the University of Maine, class of '98, from which institution he later received a degree of electrical engineer. In 1899 he entered the employ of the Western Electric Company, of Chicago, and after about two years in the factory, telephone laboratory, installing department, and engineering department, accepted a position with the Kellogg Switchboard & Supply Company to take charge of power equipment engineering. He spent four years with the Kellogg Company, designing all its power equipment, which included much original work. With the formation of the Dean Electric Co. he accepted the position of Power Engineer and Chief Installer of the Dean Electric Company in October of this year. Mr. Libby is an Associate Member of the American Institute of Electrical Engineers.

Sidney A. Beyland is a graduate of the University of Tennessee, class of '95, in electrical and mechanical engineering. After graduating he for a time was associated with telephone interests in Knoxville, Tenn., and Bristol, Va., going to Chicago in 1899 to accept a position in the drafting room of the Western Electric Company. Within six months he was assigned to the post of "checker" for the telephone department and later given charge of the circuit and cabling work, subsequently being placed in charge of the entire telephone department of the drafting room. This post he held but a short time, resigning to accept a position with the Kellogg Switchboard & Supply Company in its engineering department in charge of circuit and cabling work, and was assigned as assistant to Mr. Dean on apparatus design.

When the Dean Electric Company was organized at the first of the year, he accepted an offer from Mr. Dean to take charge of the switchboard engineering work of that company.

THE AMERICAN ELECTRIC TELEPHONE COMPANY has purchased a tract of land comprising about twelve acres, located at Sixty-fourth and State streets, Chicago, upon which it will erect a modern telephone and switchboard factory for the manufacture of all kinds of electrical equipment. The building and power plant will be of the most modern and approved construction, and will embody all of the latest ideas that have developed in this line. The factory will be built of vitrified brick, having two-story and basement frontage on State street and extending east with one-story saw-tooth roof brick building. Messrs. Nimmons & Fellows are the architects, and the general contract has been given to Jacob Rhodatz, one of the most reliable contractors in the city. The work of excavation and building was commenced some time ago, and the factory will be ready for occupancy upon April 1, 1905.

S. A. Beyland, of the Dean Electric Company.

THE FAIRBANKS-MORSE COMPANY, of Chicago, is manufacturing various types of dynamos and motors that have some very interesting features. A combination set for lighting is made in various capacities from 20 to 120 lights. In this type a gasoline motor is belted to a semi-enclosed ironclad dynamo, thus combining inexpensive cost of maintenance with a maximum of protection. Other units are made for both belt and direct drive up to 125 horse-power. For use in charging a semi-enclosed type E motor is suggested as using a small floor space and offering a large amount of protection against dust and dirt.

The company will be pleased to answer all queries with relation to its apparatus and will mail Bulletin 30 upon request.

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WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

SITUATION WANTED—Experienced cable man wants position. Understands underground construction, pulling cable and splicing or position in engineer's office; South or West preferred. Has been with present company three years. Desires change for increased experience. Address Box 280, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York

WANTED—Position as manager. At present has charge of four exchanges, common battery and magneto. Has had factory experience, building and installing complete equipment. Understands handling of men and laying out complete installations. Have rebuilt exchanges and put them on paying bases. Will be open January 1st. Address Box 277, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York

WANTED—Position as manager of an Independent exchange by a practical telephone man; best of references furnished as to ability and character. Would take a percentage of salary in stock. Middle West preferred. Address Box 290, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York

WANTED—Salesman; salary and commission; free sample telephone list; saves brain work and hours of time; sells itself; one sale sells dozens. Seeing is believing. Representative wanted in open territory. Apply at once. Telephone Appliance Co., Dept. A, 1 Madison avenue, New York. 294

POSITION wanted—A young married man of good habits would like permanent position in Middle West. Nine years' experience in switchboard, trouble, and cable work. Address Box 293, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 293

Pay-Stations

pay for themselves, and leave a big surplus in a very short time.

Installing them is the easiest way yet suggested to build up the profits.

Baird Pay-Stations

embody the highest ideals in Mechanical Pay-Stations. Their cost isn't much, and their maintenance is almost nothing.

Catalog and net price list sent free.

Baird Manufacturing Company

4 Michigan St., Chicago, Ill.

At least a carload of

TELEPHONE SUPPLIES

leaves our factory every day. Some days more than a carload; maybe two, or three. This gives an idea of the volume of our business. The reasons:

OUR SUPPLIES ARE THE BEST
OUR PRICES THE LOWEST
OUR DELIVERIES THE PROMPTEST

We make all line supplies in our own factory by machinery. We buy the rough material in quantities, securing special discount. We ship all orders direct from stock. Write us your specifications and see what we can do for you.

HUBBARD & CO.

Murtland Building **Pittsburgh, Pa.**

WE HELP TO MAKE

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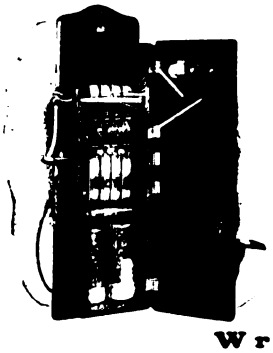

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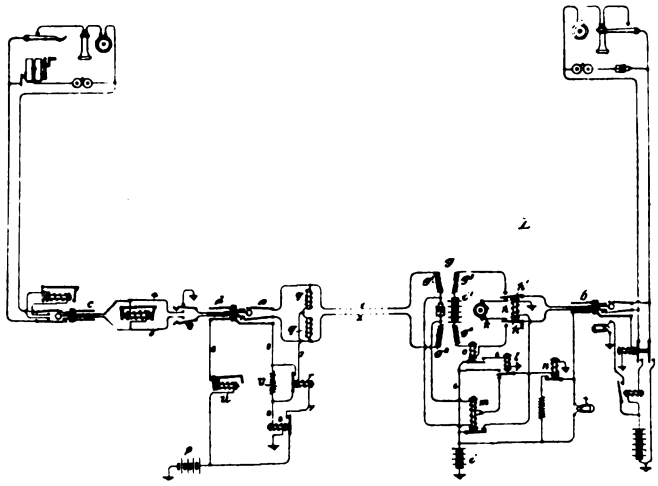
TELEPHONE PATENTS

RINGING CIRCUIT.

H. M. Crane, New York, N. Y., patents (No. 772,927). An improved ringing circuit for trunk lines, and assigns to the Western Electric Company.

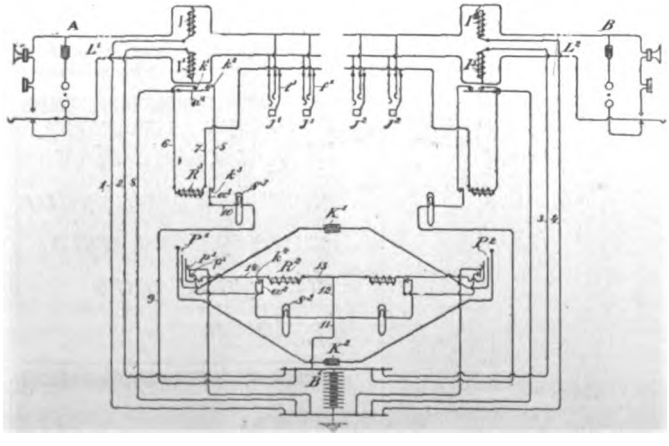
This invention is shown in the accompanying illustration and operates as follows: When the operator inserts plug *d* into jack *a* there is circuit from battery *p* through relay *s*, coils *q q* over both



sides of the trunk line through the differential windings of relay *m*; back contact of relay *l* relay *n* to ground, then relay *m* is not excited, but relay *n* is, and the supervisory *t* shunted out. When the *A* operator wishes to ring she presses key *e*, grounding limb *I*. Current from battery *q* divides at the coils *q q* on account of the ground on limb *I*. Hence relay *m* is excited, closes its contact, operates magnetic ringing key *h* and rings the subscriber.

CIRCUIT FOR COMMON BATTERY SWITCHBOARD.

H. T. Cedergren, of Stockholm, Sweden, patents (No. 772,782) an improved circuit for common battery switchboards. The object of this invention is to provide a circuit for a common battery switchboard, so arranged that the line relay controls the calling signal and the supervisory signals as well. This circuit is illus-



trated in the accompanying drawing. The armature a'' of the relay *l'* closes two contacts *k'* k^3 Wire *5* connects contact k^2 with receiving stud *k3* for armature of relay *R3*. The signal *S3* is thus connected with armature *a3* and with battery *B'* and control *k3* is joined to relay *r3* by wire *6* and wire *7* extends from relay to test springs *f'*. Armature *a* is connected with the other pole of battery *B'* by wire *8* and to earth. In the third conductor a relay *R3* is inserted, the conductor also running to battery. Armature *a2* of relay closes and breaks circuit through clearing out signal *S2* when plug *P'* is lifted and thus contact *p* controlled by plug is closed. Contact *p'* is hinged and has a spring tending to hold its lower end with contact *p2*, when plug *P'* is moved, connection with *p2* is broken.

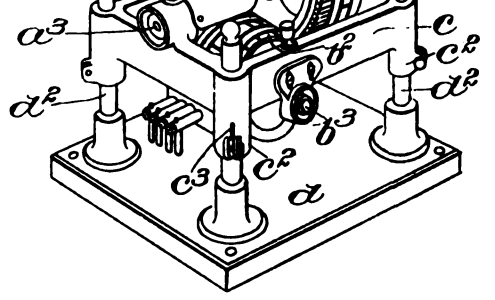
MOUTHPIECE PROTECTOR.

G. E. Grimm, Collingswood, N. J., patent (No. 772,286) and assigns one-half to J. J. Sleeper, Philadelphia, Pa.; an improved antiseptic attachment.

This is a device to protect the mouthpiece of transmitters. The inventor cuts out a circular disk of stiff paper, and punches a hole in the center, having thin paper ears, which clasp the transmitter mouthpiece and hold the disk in place. The hole in the paper disk is then covered with tissue paper soaked in any antiseptic. The disk may be thrown away and renewed as often as desired.

SIGNALING DEVICE.

D. M. Bliss, Brookline, Mass., patents (No. 773,187) and assigns to the Hottzer-Cabot Co., of Brookline, an improved signaling device. The object is to provide a self-contained apparatus to



operate one or more commutators, which may be attached to any source of signaling current, and transform said current in any way desirable for signaling. In the illustration *d* is a base plate supporting a frame *c* supporting the commutator aa^2, bb^2. A coupping a^5 is provided, whereby the machine may be attached to any motor that may be desired.

CUT-OUT.

J. R. Harris and C. A. Harris, Trenton, Mo., patent (No. 772,936) a telephone cut-out.

The object of this invention is to provide a cut-out for grounded lines to be used as a protection from lightning, and to enable two different lines to be switched together. The inventor provides a base plate, to which the line wires are attached by insulators, and on which there is a pivoted lever, to the center of which the telephone is attached. This lever is so arranged that it can connect the telephone to either line, or completely open the circuit. It is operated by a cord that extends from the base plate to the telephone.

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THE WEEK'S MESSAGES

FINANCIAL.

HOT SPRINGS, ARK.—Barber and Brailey have sold out their interests in the local plant to Leo M. Flesh and his associates at Piqua, Ohio, who were interested with Barber and Brailey in the system.

STEWART, GA.—Stewart Telephone Co. has declared a dividend of 20 per cent.

KINGSLEY, IOWA.—The Kingsley Telephone Co. has increased its capital stock to $15,000.

MORRISTOWN, TENN.—The Citizens' Telephone Co. has increased its capital stock to $18,000.

McKINNEY, TEXAS.—The McKinney Telephone Co. will increase its capital stock from $10,000 to $20,000.

BRIDGEPORT, W. VA.—At a recent meeting of the Belmont Telephone Company, it was decided to call a special meeting for the 27th of December to discuss the increase in capital stock from $75.000 to $150,000.

FRANCHISES.

CRIPPLE CREEK, COLO.—M. H. Spear, general manager of the El Paso Telephone Company, has applied for a franchise in this city.

JERSEYVILLE, ILL.—The City Council has granted a franchise to the Kinloch Long Distance Telephone Co. of Missouri.

ESTHERVILLE, IA.—The City Council has granted a franchise to the Emmet County Telephone Co.

PORT DEPOSIT, MD.—The Town Council has granted a street franchise to the Martland Telephone Co.

NEW ULM, MINN.—Dr. J. H. Vogel, on behalf of the Blue Earth City Telephone Company, has applied for a franchise in this city.

ARGENTINE, MO.—The Home Telephone Co., of Kansas City, has been granted a franchise in this town for a period of twenty years.

MEXICO, MO.—The Mexico Ladonia Telephone Co. has applied for a franchise in this city.

BUTTE, MONT.—The Yellow Stone Park Tel. & Telephone Co. has applied for a franchise for a telephone system in this city.

MIDDLETOWN, OHIO.—The Middletown Home Telephone Co. has won its suit for a franchise to operate a telephone system in this city.

DALLAS, TEXAS.—S. A. Jones and F. B. McElroy have applied for a franchise to construct a long distance system to connect this city with outside points.

MADISONVILLE, TEXAS.—H. B. Huston has secured a telephone franchise for this city, and will build long distance line to connect with outside points.

LANDER, WYO.—D. G. Cahoon was granted a franchise for a telephone system in this city.

ELECTIONS.

WOODBURY, CONN.—The Waterbury Automatic Telephone Co. at a recent meeting elected the following officers: President, H. D. Curtiss; vice-president, A. D. Warner; treasurer and secretary, G. F. Harvey; superintendent and general manager, R. F. Harvey.

GARDNER, ME.—The officers of the recently incorporated Woodland Telephone Co. are: President, F. S. Collins, of West Gardner; treasurer, Jas. T. Collins, of Manchester; clerk, H. E. Emery, Manchester.

COUNCIL BLUFFS, IA.—The Council Bluffs Independent Telephone Co. has elected the following officers: President, E. H. Longee; vice-president, E. H. Merriam; secretary, F. J. Day; treasurer, E. G. Turner.

COMBINATIONS.

CLINTON, ILL.—The Farm & City Telephone Co. has sold its system to the National Telephone & Electric Company, which has bought the Farmers' Interstate Telephone system. B. F. Wasson, of Clinton, Ill., is president; S. H. Martin, of Waynesville, Ill., secretary and treasurer.

DIXON, ILL.—Dixon Home Telephone Co., recently incorporated with a capital stock of $125,000, has taken over the property and business of the Lee County Telephone Company.

LUTHER, MICH.—The Citizens' Telephone Co., of Grand Rapids, has purchased the exchange of the Luther Co. J. B. Prout will be retained as manager.

MARSHALL, MICH.—The Citizens' Telephone Co., of Grand Rapids, has purchased the telephone equipment of Dr. F. M. Foote.

LAKE CRYSTAL, MINN.—Henry Graif has sold his interest in the Blue Earth Telephone o. for $6,000.

ST. PAUL, MINN.—L. C. Erbes has purchased the Oakville Telephone Exchange.

SAUK CENTER, MINN.—The Sauk Center Telephone Exchange has been sold to J. W. Ward.

PERU, NEB.—The Peru Telephone Co. is now controlled by Mr. Abbott.

ARGYLE, WIS.—A. G. Hawley has purchased an interest in the Argyle Telephone Co.

NEW COMPANY NOTES.

BATESVILLE, ARK.—The Batesville Telephone Company has been incorporated with a capital stock of $50,000 to give telephone service to Cushman, Barren Fork, Melbourne, Jamestown, Cave City, Desha, Evening Shade, Hickory Valley, Salado, Marcella, O'Neal, Bethesda, Victor, Franklin, Hardy, Ash Flat, Sidney and King's Mill. The officers of the company are: E. A. Glenn, president; G. B. Ortman, vice-president and general manager; Miss Cora Maxfield, secretary and treasurer.

LITTLE ROCK, ARK.—The Siloam Springs Telephone Company has been incorporated with a capital stock of $50,000. R. J. Alfrey, president; M. T. Stahl, secretary and treasurer.

AUBURN, ILL.—The Auburn Telephone Company has been incorporated with a capital stock of $35,000 by W. H. Ramsey, E. R. Conklin and F. W. Kelley.

BLUFFS, ILL.—The Farmers Exchange Telephone Company has been incorporated with a capital stock of $10,000 by H. Knoepple, G. W. Vangundy and Henry Finnigemrier.

CHICAGO, ILL.—The Chicago Subway Company has been incorporated with a capital stock of $50,000,000, and has taken over the property of the Illinois Tunnel Company.

ST. JOSEPH, ILL.—The St. Joseph Telephone Company has been incorporated with a capital stock of $18,000, to construct a telephone system in this village. The officers are: O. C. Boggs, president, Urbana, Ill.; T. J. Wordin, vice-president, St. Joseph; N. G. Glascarch, treasurer, St. Joseph; J. O. Henderson, manager, St. Joseph. Three hundred subscribers are expected for a start.

ELKHART, IND.—The Pullman Telephone Company has been incorporated to build and operate exchanges in Edwardsburg and Pullman, Michigan. The capital stock is $10,000. Officers: J. K. Johnston, president, Elkhart; M. Elerow, secretary and treasurer; Charles D. Kem, manager.

GREENWOOD, IND.—The Greenwood Telephone Company has filed a certificate increasing its capital stock from $10,000 to $13,000 on account of improvements and extensions contemplated.

MUNCIE, IND.—The Nostrom Lock Out Telephone Company has been incorporated with a capital stock of $600,000 and will engage in the manufacture of telephones. The directors are J. Marting, G. W. Beers, G. A. Ball, J. H. Smith and A. L. Johnson. The company will operate a factory in this city.

BLAKEVILLE, IA.—The Blakeville Farmers Mutual Telephone Company has been incorporated with a capital stock of $5,000. C. W. Smith is president.

COUNCIL BLUFFS, IA.—The Independent Telephone Company of Council Bluffs has filed its articles of incorporation and its application for a franchise.

LINCOLN TOWNSHIP, SHELBY CO., IA.—The Farmers Mutual Telephone Company has been incorporated with a capital stock of $10,000 by H. H. Paup and others.

NORWALK, IA.—The Middle Branch Telephone Company has been incorporated with a capital stock of $1,200 by W. A. Cotinam and others.

VINCENT, IA.—D. H. Martin, of the Webster City Telephone Company, has arranged with local citizens to install a telephone system. A company will be formed known as the Vincent Telephone Company.

VINNIE, KY.—The Vinnie Telephone Company has been incorporated with a capital stock of $1,000, by John Hill, B. H. McGaham, and G. A. McKinley.

CLINTON, MD.—The Sampson Telephone Company has been incorporated with a capital stock of $20,000.

LAMONT, MO.—The Lamont Telephone Company has been incorporated with a capital stock of $5,000, by W. E. Files, W. F. Yankee and others.

ARCHER, NEB.—The Archer Independent Telephone Company has been incorporated with a capital of $50,000, by A. J. Harshberger, J. B. Templin and others.

ANDOVER, N. Y.—The Pony Telephone Company has been incorporated with a capital stock of $200. The officers are: O. Smith, president, Andover, N. Y.; J. W. Jenkins, vice-president, Andover, N. Y.; William N. Pingrey, secretary, Andover, N. Y.; Elmer Kaple, treasurer, Andover, N. Y.

BARTON, N. Y.—The Ross Hill & Barton Independent Telephone Company has been incorporated with a capital stock of $2,000. Dr. A. J. Terwilliger, president, and F. C. Bailey, secretary.

CASTLETON CORNERS, S. I., N. Y.—The Castleton Corners Telephone Company has been incorporated with a capital stock of $5,000 to construct and operate exchanges at Castleton Corners and New Dorp, S. I. The officers are: C. H. Wickert, president; William Hauser, vice-president; M. H. Gescheidt, manager; C. C. Schmidt, chief engineer, all of Castleton Corners; H. G. Hoffman, secretary and treasurer, Clifton, S. I.

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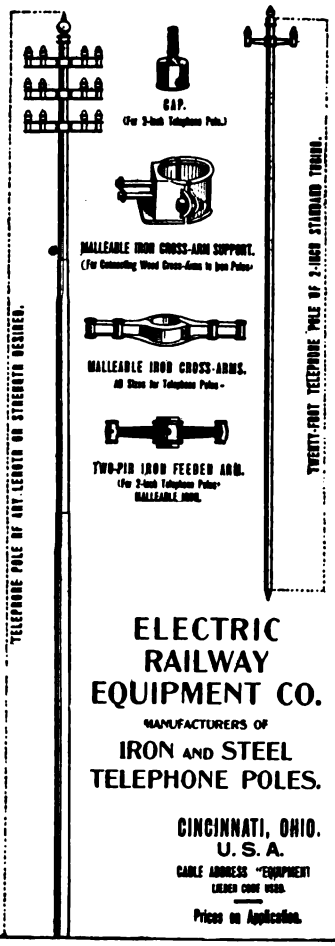

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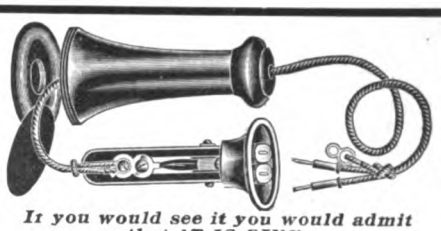

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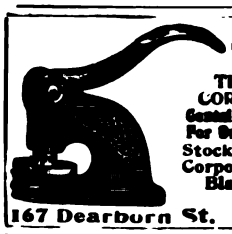

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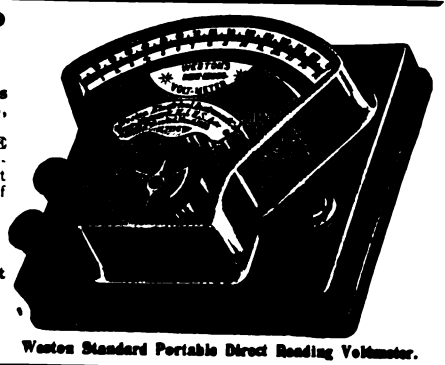

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FAIRHAVEN, N. Y.—The Sterling Telephone Company has been incorporated with a capital stock of $960, to give telephone service in Fairhaven, Sterling, Crockett's Station, Hannibal and North Fairhaven. The officers are: President, W. B. Reed, Sterling; vice-president, C. A. Wildie, Fairhaven; secretary and treasurer, W. W. Green, Fairhaven.

LEONARDSVILLE, N. Y.—The Leonardsville Telephone Company has been incorporated with a capital stock of $1,000, to operate telephone lines in Otsego, Madison, Oneida and Herkimer counties. Directors: E. S. Brand, A. P. Brown, of Leonardsville; L. A. Baldwin, of Brookfield, and I. T. Welch, of Edmonston.

CLINTON, N. C.—The Sampson Telephone Company has been incorporated with a capital stock of $20,000.

STAFFORD, O.—The Stafford & Marietta Telephone Company has been incorporated with a capital stock of $10,000, by G. W. Robinson, A. G. Hughes, A. E. Robinson and others.

BERLIN, ONT.—The farmers in Waterloo county are contemplating the organization of a telephone system. Wendell Shantz has the matter in charge.

GEORGETOWN, S. C.—The Georgetown and Camp Field Telephone Company has been incorporated by M. W. Pyatt and O. B. Skinner.

BROWNWOOD, TEX.—The West Texas and Brownwood Telephone Company has been incorporated with a capital stock of $100,000 to operate exchanges in Brownwood, Ballinger, Coleman, and Goldthwaite, also 350 miles of toll lines. The officers are: J. A. Walker, president; H. T. Williams, vice-president; C. H. Woodward, secretary, treasurer and manager; of Brownwood.

BLAINE, WIS.—The St. Croix Farmers Mutual Telephone Company has been incorporated with a capital stock of $5,000, by C. H. Chipman, H. B. Dunn, L. T. Fournier, J. V. Carter and Richard Goldschmidt.

LONE ROCK, WIS.—The Lone Rock Telephone Company has been incorporate with a capital stock of $1,500, by Andrew Harter, George Jamieson and H. A. Brace.

WHITE OAK, WIS.—The White Oak Telephone Company, of White Oak Springs, has been incorporated with a capital of $25,000, by H. A. Beckwith, J. Edge and Mrs. S. J. Coulthard.

PERSONAL

OLIVER J. HAWKINS has been appointed manager for the Home Telephone Company at Cohoes.

ELMER E. LARKAN has been appointed manager for the Inter-Ocean Telephone Company at Penn Yan, N. Y.

FRED WAKEFIELD has been appointed manager of the telephone system at Lapeer, Mich.

SAMUEL STRONG has been elected secretary of the Home Telephone Company of Cohoes and Waterford, N. Y.

HARRY H. HART has been appointed manager for the United Telephone Company at Hanover, Pa.

MISCELLANEOUS.

SEDAN, KAN.—The Dosbaugh Telephone Company, with exchanges at Caney, Peru, Elger, Sedan and Cedar Vale, Kas., has finished cutting all its lines from ground to metallic circuits. This company has a territory seventy by seventy miles and about $85,000 invested in telephone property. It now has 1,000 subscribers.

LEWISTON, ME.—The loss to telephone companies due to the recent storm is estimated at about $150,000.

BAY CITY, MICH.—It is reported that the Valley Telephone Company, which operates exchanges in this city and Saginaw, will consummate a closer working agreement with the Citizens' Telephone Company of Grand Rapids.

DASSEL, MINN.—The Dassel and Collingwood Telephone Company has its new exchange in running order, long distance connections are made with toll lines of the Tri-State Telephone Company and two circuits are used.

LUVERNE, MINN.—The Beaver Creek telephone system has been connected with the Mead line which has its headquarters here.

MANKATO, MINN.—The Minnesota Valley Telephone Company now have their line open through to Herod Lake, Luverne, Brewster, Pipestone and Sioux City and Mitchell, S. D.

WATERVILLE, MINN.—The Cannon Valley Telephone Company now has five exchanges established at Elysian, Janesville, Montgomery, Le Sueur Center and Waterville.

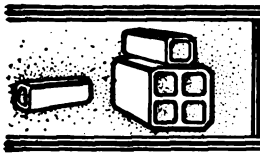
WINDOM, MINN.—The Windom Mutual Telephone Company is now in connection with Worthington, Luverne, Adrian, Sioux Falls and Pipestone. In a few days many other stations will be opened and during the month most of the towns of the Southwest can be reached over the Mutual connections.

GAINESVILLE, FLA.—The East Florida Telephone Company expects to extend its system to Tacoma, Wacahoota, Micanopy.

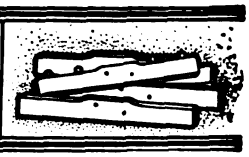
PEORIA, ILL.—The Interstate Telephone and Telegraph Company will install a new switchboard at once in this city.

CHARLESTON, ILL.—The Charleston Telephone Company will extend its lines to Salisbury.

STERLING, ILL.—The Interstate Telephone Company is building a long distance line to Rock Island from this city. A new line will also be built to Dixon which will give three circuits between the two cities.



New Construction in the Field



AMBOY, IND.—W. H. Meyers, manager of the Amboy Telephone Company, states that construction work will be done upon the system, and that an exchange will be placed at Converse next spring.

RUSHVILLE, IND.—Extensive improvements will be made to the line of the Rushville Co-Operative Telephone Company by J. F. Butterfield & Co., of Chicago.

FORT WAYNE, IND.—The Home Telephone Co. will extend its system into the rural districts.

DAVENPORT, IA.—A wire is being strung along the L. & I. R. R. for the installation of a telephone system.

DAVENPORT, IA.—The Union Electric Company will extend its toll system at once.

HARRIS, IA.—Dr. C. C. Cady and Otto F. Unz will construct a rural telephone line in this vicinity.

SIBLEY, IA.—A new rural telephone line is being constructed from Harris, Osceola county.

STEWART, IA.—The Mutual Telephone Company is considering a new exchange.

WEBSTER CITY, IA.—C. L. Briggs has been awarded the contract for the building of the Martin Telephone Company. J. R. White is architect.

LINCOLNVILLE, ME.—The Lincolnville Telephone Company will construct a four-mile extension to its system, and add several new subscribrs.

WILLIAMSBURG, MASS.—The Citizens Independent Telephone Company is erecting a pole line through the main street.

HOPKINS STATION, MICH.—The Citizens Telephone Company is improving the property which it purchased from the West Michigan Telephone Company.

OSTRANDER, MINN.—The Farmers Telephone Line will be extended from this village to Grand Meadow.

RICHWOOD, MINN.—A complete telephone line will be established during the coming year to Richwood, Callaway and the surrounding country.

SEAFORTH, MINN.—A telephone exchange is being installed here.

WALKER, MINN.—The Cass County Farmers Mutual Telephone Company will extend its telephone lines in the near future.

EMERSON, NEB.—A rural telephone line is being built west from here.

WESTBROOK, MINN.—The Southwestern Minnesota Telephone Co. contemplates installing an exchange in this city.

WATSON, MINN.—The Citizens' Telephone Company will extend its system in the near future.

KANSAS CITY, MO.—The Kansas Construction Company, which consists of the Home Telephone Company and the Barber and Brailey interests, will build additional long distance lines throughout the State to connect with the Home Telephone Company. Work has already been started.

BOZEMAN, MONT.—The Yellowstone Park Telephone and Telegraph Company has completed a line to this city, and will connect with Big Timber, Helena and Butte.

BLAIR, NEB.—The Blair Telephone Company has recently completed a new line west of this city.

DIXON, NEB.—John Mills and W. P. Truax are interested in a telephone company that will construct a system in this village.

SEWARD, NEB.—The Seward County Telephone Company will commence the construction of a local system at once.

HENNIKER, N. H.—The Henniker Telephone Company has extended its lines to Deering and Hillsborough.

CHESTER, N. J.—The Chester local telephone company will extend its system to suburban territory.

LEBANON, N. J.—The Lebanon Telephone Company is building a line to Flemington.

BUFFALO, N. Y.—The Inter-Ocean Telephone Company is installing a system in Geneseo.

PENN YAN, N. Y.—The Inter-Ocean Telephone Company is constructing a new line between this point and Watkins.

MT. VICTORY, O.—The Mt. Victory Telephone Company will construct several new lines this winter.

DOYBESTOWN, PA.—The Standard Telephone Company is constructing a through line from Quakertown to Philadelphia.

NEW ALBANY, PA.—The New Albany Telephone Company will construct lines from New Era, Bradford county, to Evergreen to New Albany and there connect with the New York & Pennsylvania Telegraph & Telephone Company; also from Overton, Bradford county, to Campbellsville, Eldredsville, Estrella and Forksville, Sullivan county. The directors are: Ray S. Wilcox, Rufus Decker and S. D. Sterigere, of New Albany; James J. Hannan and A. J. Bird, M. D., of Overton; Watson Fawcett, of Campbellsville; G. W. Heverly, of Sayre; G. A. Rogers, of Forksville, and George Horton, of New Era.

SHUKSHINNY, PA.—The People's Telephone Company will extend its line to Roosevelt.

WAYNESBURG, PA.—The Standard Telephone Company is making extensive improvements to its system.

WORCESTER, PA.—The Montgomery Telephone Company will extend its line to Norritonville.

CHAMBERLAIN, S. D.—Frank B. Roe has completed his line to Grand View and expects to extend it into Oklahoma.

EDGEMONT, S. D.—Hugh Houghton and five others have put in a telephone line from Hot Springs.

SHERMAN, TEX.—The Graystone County Telephone Company will build a line to Howe as soon as twenty subscribers are secured.

MONTPELIER, VT.—The Orange County Telephone Company will extend its lines to Berlin, Williamstown and Barre.

NORTHFIELD, VT.—The Northfield Telephone Company will make numerous extensions in the near future.

ST. JOHNSBURY, VT.—The Citizens' Telephone Company is extending its lines to West Danville and Danville.

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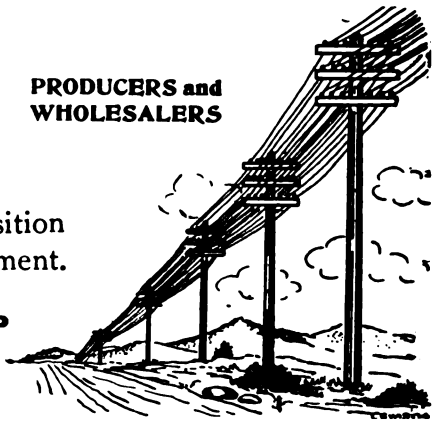

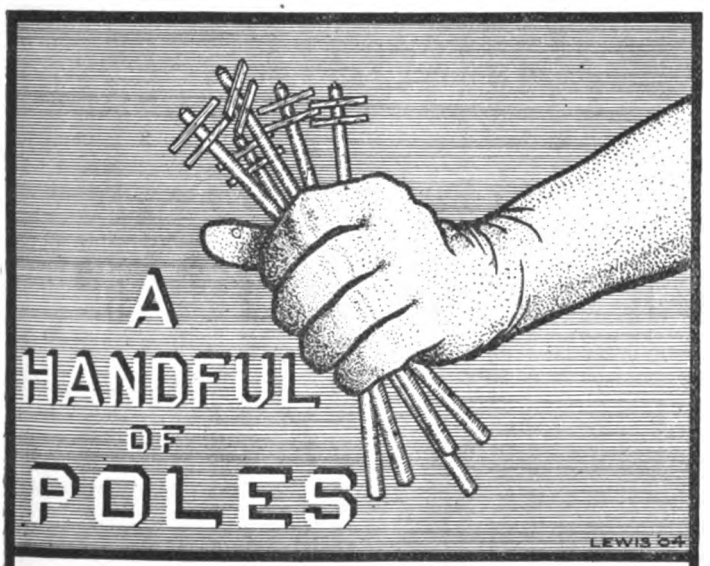

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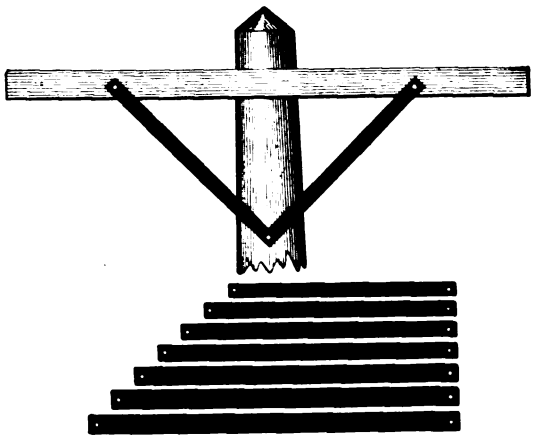

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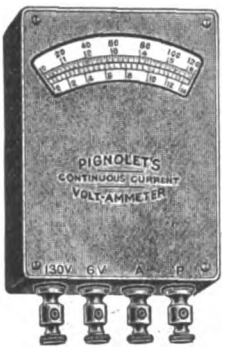

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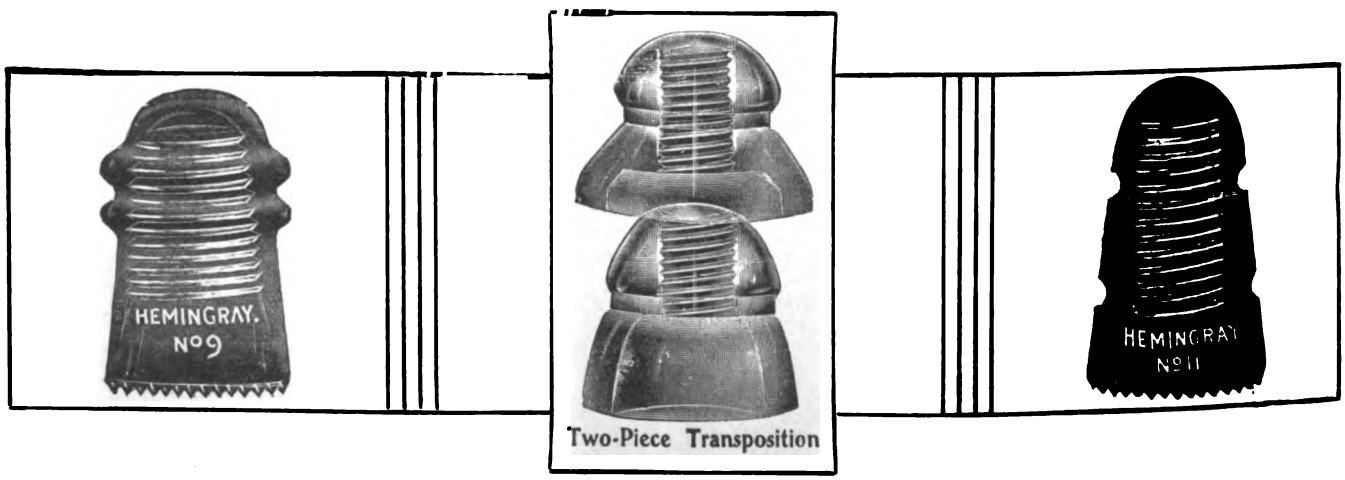

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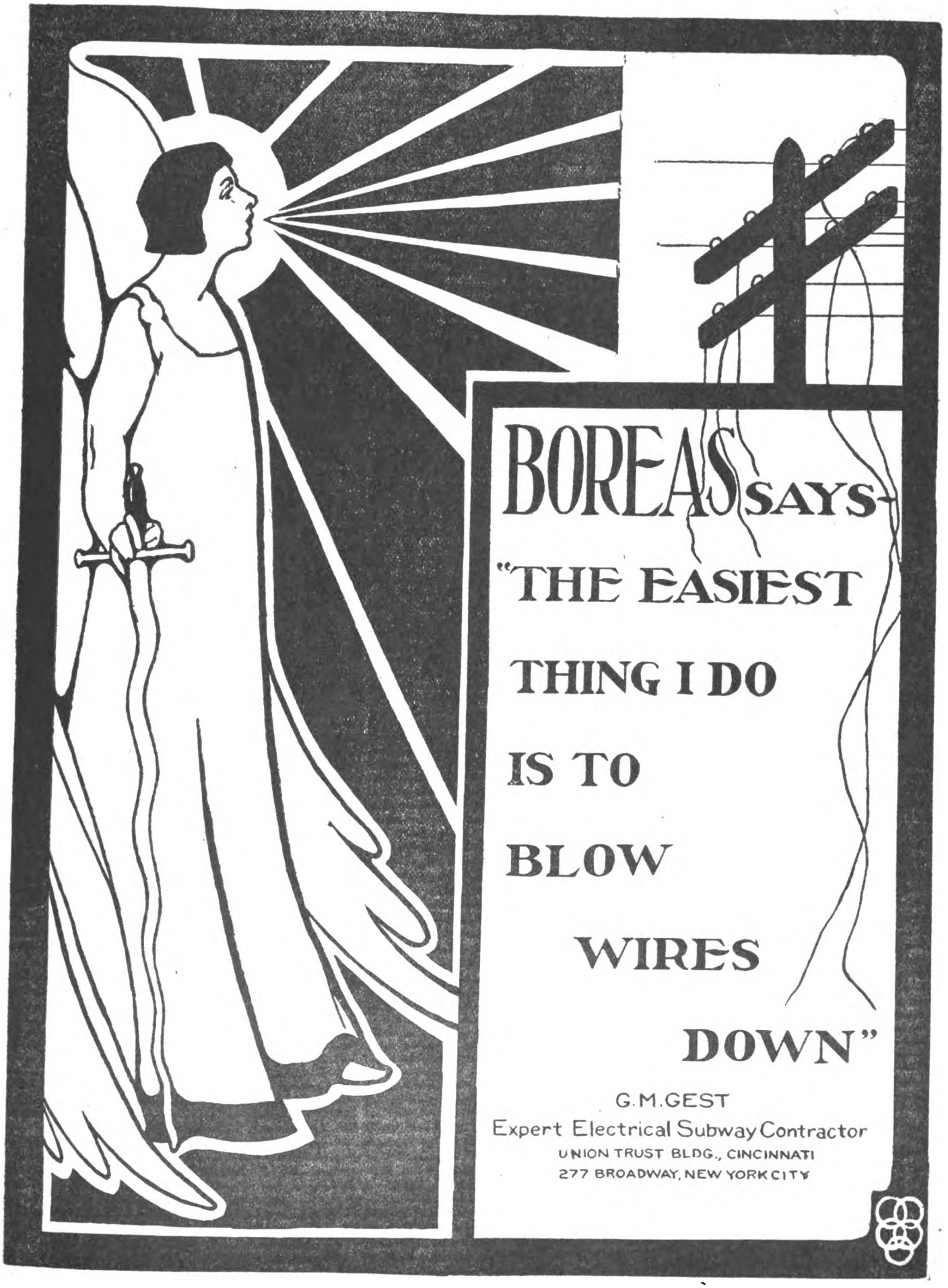

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" " 24—Composite Telephone and Telegraph Lines
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" " 26—Telephone Power and Ringing Equipment

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THE AMERICAN TELEPHONE JOURNAL

Special Attention

The editor believes that every reader of this paper is vitally interested in the subject discussed this week on page 399.

As a special favor, therefore, he asks a careful reading of the matter.

He would like every reader of this paper to write him a letter expressing an opinion regarding this editorial.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—DECEMBER 10, 1904—CHICAGO Number 24

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Contents, Page 2. Advertisers' Directory, Page 9.

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The AMERICAN TELEPHONE JOURNAL

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CONTENTS.

A STUDY ON TRAFFIC BY THE TRAFFIC MANAGER

THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER
Article V, Circuits and Their Operation, By A. DALLAM O'BRIEN

HOW THE KEYSTONE FURNISHED THE ELECTION RETURNS.....By FRANK C. OGDEN

WHERE IS THE FOOL KILLER?

The Operating Field.

THE DEVELOPMENT OF LONG DISTANCE LINES IN WESTERN PENNSYLVANIA

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TELEPHONES IN FRANKLIN COUNTY, IOWA

SOME INDEPENDENT FINANCIAL REPORTS

IN THE MANUFACTURING FIELD

THE TELEPHONE IN THE COURTS

QUERIES THE EDITOR'S PAGE PATENTS THE WEEK'S MESSAGES

WANT AND FOR SALE ADVERTISEMENTS, PAGE 33

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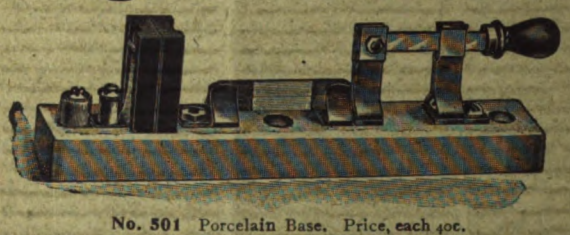

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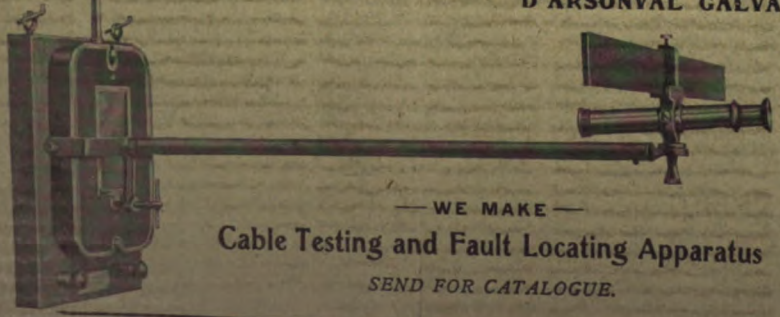

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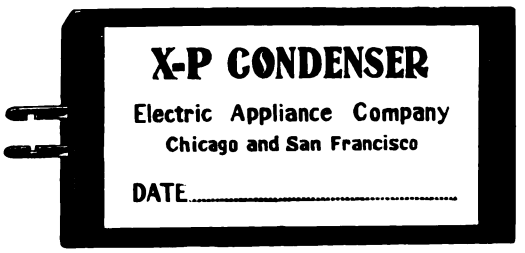

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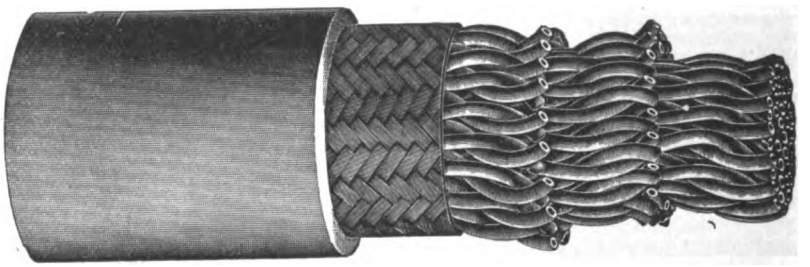

INDIANA RUBBER AND INSULATED WIRE CO.

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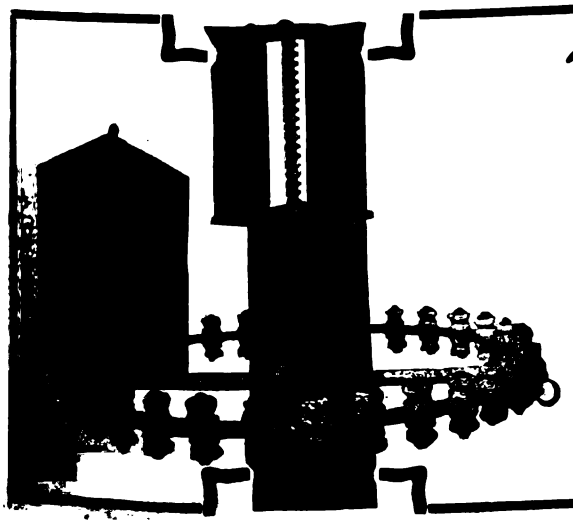

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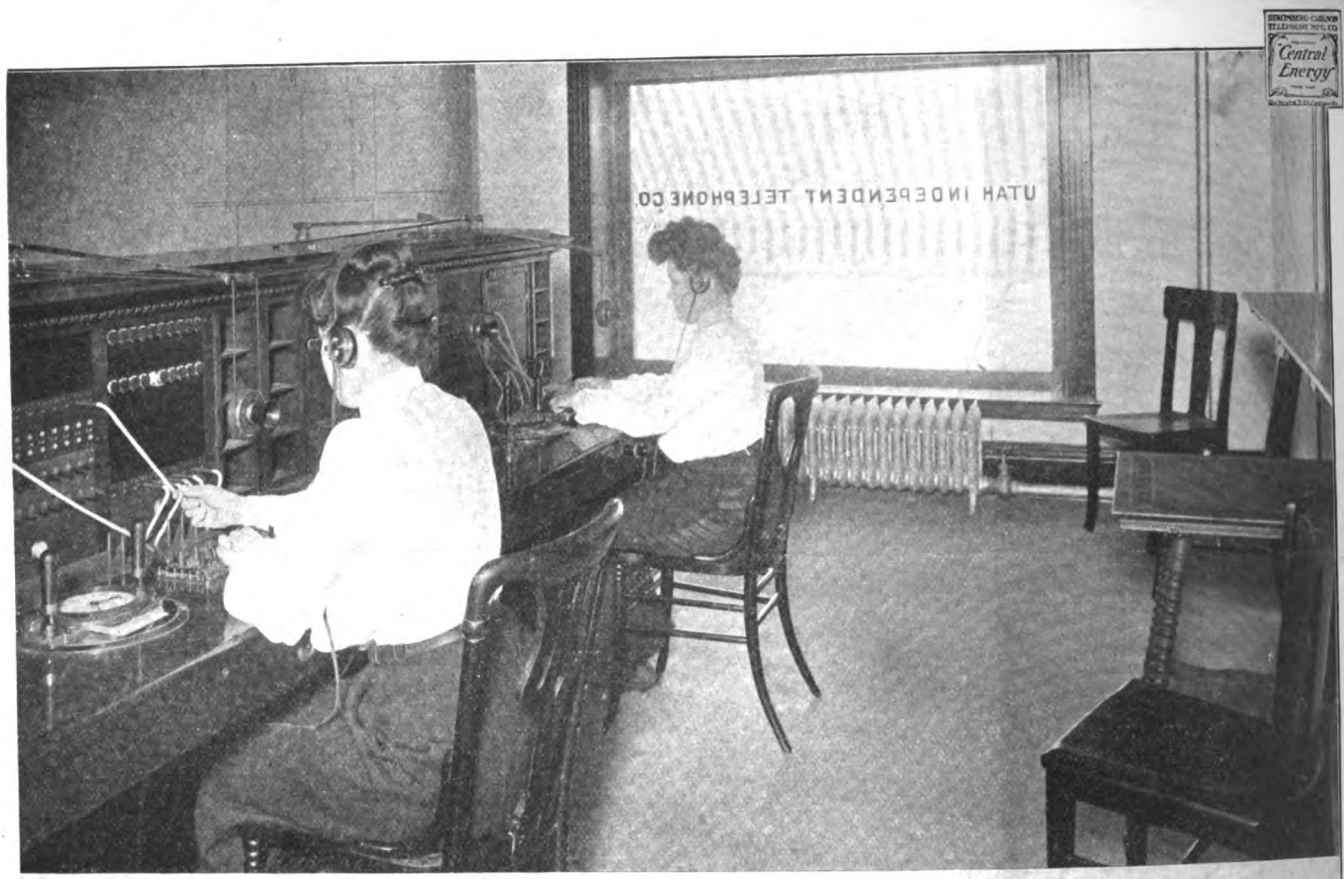
STROMBERG-CARLSON TOLL BOARDS

This illustrates one page taken from our Toll Board Bulletin No. 12-B.

The information we give on the subject of "Toll Equipments for Telephone Exchanges" should be of value to every exchange manager.



FOUR-POSITION TOLL BOARD—TWO SECTIONS
CABINET No. A-2474
AS OPERATED BY
UTAH INDEPENDENT TELEPHONE CO.
SALT LAKE CITY, UTAH

No other catalog or bulletin ever issued deals with this subject so extensively.
We are glad to mail a copy to managers interested in this subject.
Just ask for Bulletin No. 12-B.

Stromberg-Carlson Tel. Mfg. Co.

General Offices, ROCHESTER, N. Y.
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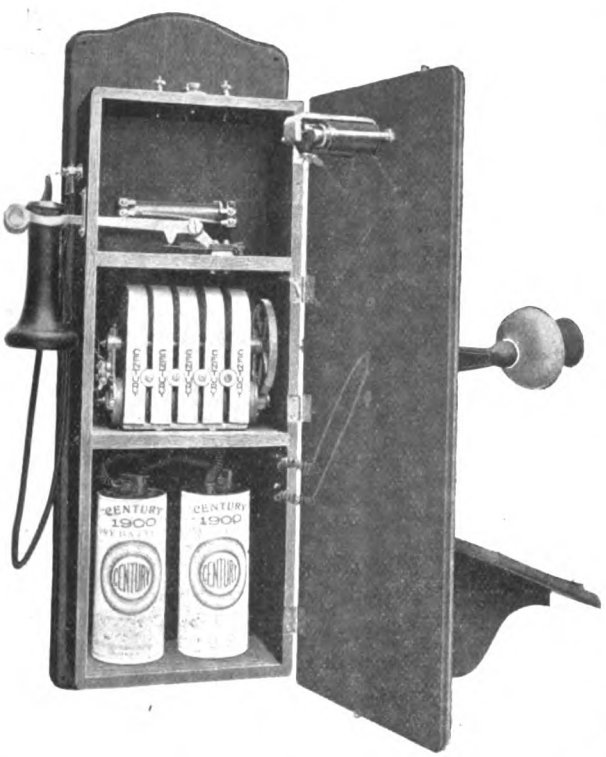
CENTURY
100% GOOD

Century Bridging Telephones



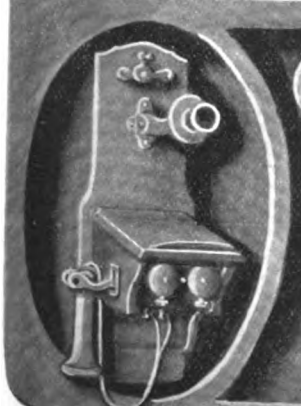
for Farmer and Party lines are provided with a push button, so the subscriber can call Central without ringing the bell of any other subscriber on the line, or can call other subscribers on the line without calling Central.

We also equip Bridging telephones with condensers, so that leaving the receiver off the hook does not prevent Central from ringing other telephones on the same line.

All Century telephones are manufactured from the best material and according to the latest and most approved methods, and are fully guaranteed in every way.

A sample telephone will be sent you, charges prepaid

WRITE FOR PRICES



CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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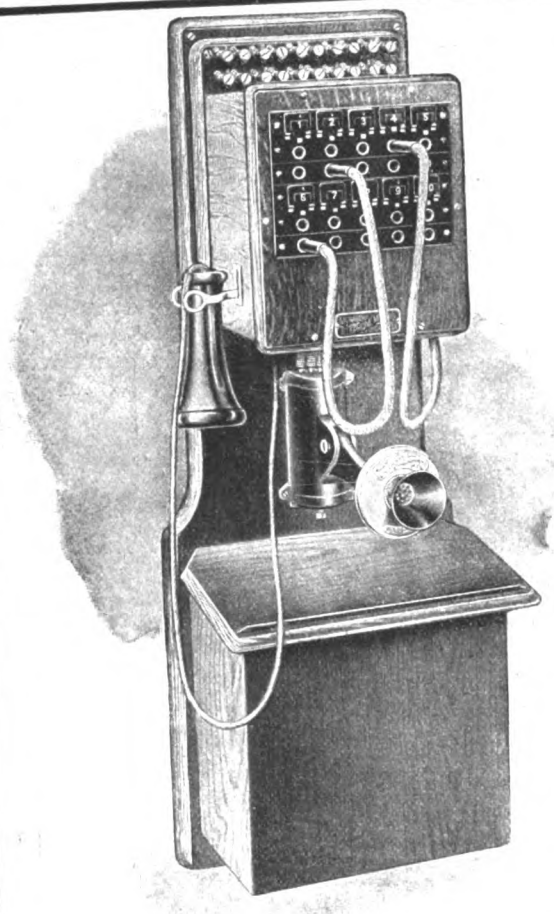


A Small One?

Yes, and the first one; but all great things start from small beginnings.

This is the first MONARCH board placed in operation and it used but 10 drops and jacks. Since then, just two months ago, we have sold over 2,000 drops and jacks installed in boards. The smallest is here shown; the largest has 300 drops and jacks. It will interest you to get a complete description of the

Monarch Switchboard.

It will pay you to get our prices.

MONARCH TELEPHONE MFG. CO.

10-16 So. Clinton St. Chicago, Ill.

"COUCH"

Automatic Reset

Intercommunicating

'Phones

are made in several styles for both wall and desk use. The standard sizes are 10, 16, 20, 26 and 30 station capacity

Local or Central Battery Systems

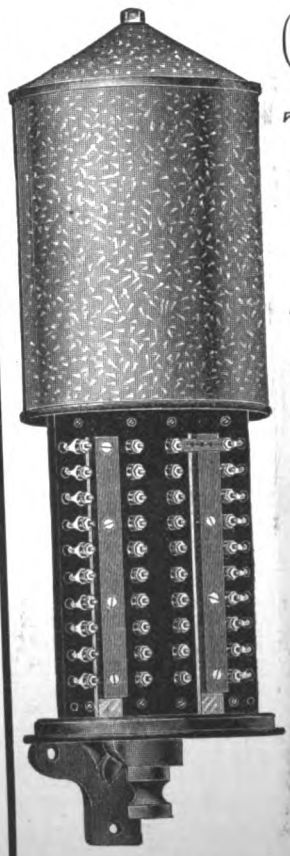
Ideal service for factories, offices, homes, etc.

Exchange men should promote this service and connect same to their exchange.

Increases your profits. Get posted anyway.

S. H. Couch Co.
Manufacturers
162 Pearl Street
Boston, Mass.

WALL SET
Style No. 38



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THE MOST PERFECT, CHEAP AND EFFICIENT TERMINAL ON THE MARKET. .. ..

SAMPLES SENT FOR INSPECTION.

Hipwell Mfg. Co.

ALLEGHENY, PA.

Please Mention the AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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It's the Little Gem
NO TRICK TO GET INSIDE

SHEATH OPENS LIKE A CUFF

The best to use because the best looking, most accessible and in every way the most satisfactory Extension Bell on the market.

Series, $1.50 1000ohm $2.50 1600ohm, $2.75

Mail this with your order; it will bring you a rebate of 25c. per bell

Fill Out, Mail To-Day.

Please send me .....Little Gem Extension Bells.

Ringer movement .....

Name.....

Address.....

The Vought-Berger Company

MAKERS OF FIRST-AWARD

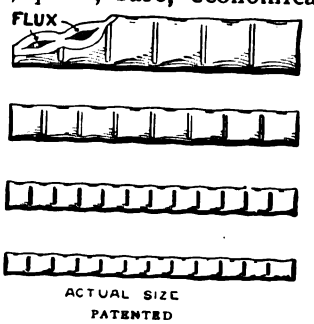
Telephones and Switchboards

LaCrosse, Wis, U. S. A.

If you want solder that will flow quickly and surely to place and leave smooth work without losing time in preparing or applying flux acid, get

Kester Self-Fluxing SOLDER

Clean to handle, quick, sure, economical and convenient.



Made in four sizes and with various fluxes,—"Kester" rosin, stearic acid, etc.

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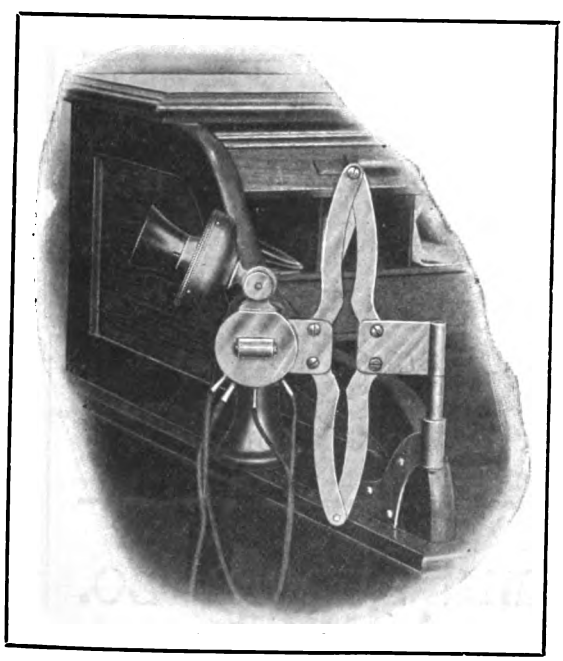
KESTER ELECTRIC MFG. CO.

52 No. Union St., CHICAGO, ILL.



The Adjustaphone

THE Ideal Telephone. Costs no more to install than the old style breakable kind. The cost to maintain is nothing, as it cannot fall or break. **The time and expense of sending troublemen to make insignificant repairs that you cannot charge for, is reduced to the minimum.** Your subscribers cannot be careless with an **ADJUSTAPHONE**—it will take care of itself anywhere you put it, and **save its cost to you once every year.** Made for any transmitter, receiver or system, and for any style desk. Write for particulars and prices. Both will interest you.

TELEPHONE DEPARTMENT

Chicago Writing Machine Co.

Manufacturers **312 WENDELL STREET, CHICAGO**

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THE KELLOGG SWITCH-BOARD & SUPPLY CO.

Has Again Received

WORLD'S FAIR HIGHEST AWARD

FOR TELEPHONE SYSTEMS AND APPARATUS

IT was the GOLD MEDAL at the Buffalo Exposition. Now it is the GRAND PRIZE at the Louisiana Purchase Exposition, and the largest cities in the United States, equipped with Kellogg Telephone Systems, will heartily bear out with their recommendations the assigning of this award.

Write for our catalogues, bulletins and quotations.

The Kellogg Switchboard and Supply Co.

Green and Congress Streets, Chicago

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LOS ANGELES

ELECTRIC BUILDING
CLEVELAND

KEYSTONE TELEPHONE BUILDING
PHILADELPHIA

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You Don't Need Our System

if you don't operate party lines.

But if you have rural party lines and wish to give subscribers the advantages of private lines,

You Do Need Our System.

Better, quicker and more service at less operating expense.

Cost of system is small, benefit great, satisfactory to manager, subscriber, central operators and stockholders.

For Ground Lines, Straight Metallic and "Divided Circuit" Metallic Lines.

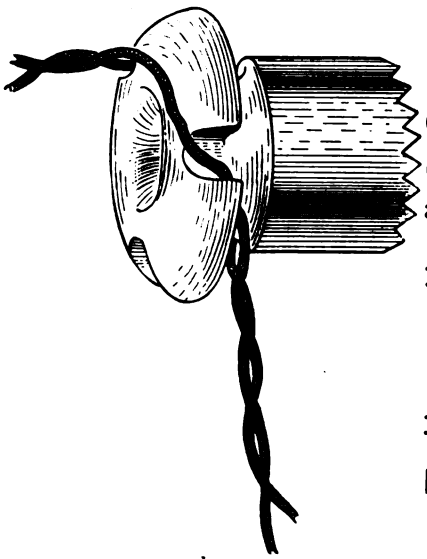
WRITE FOR PARTICULARS AND PRICES TO-DAY

The T. & A. Selective Call Co.

Sole Manufacturers GENESEO, ILL.

Patented, others allowed and pending.

Polk Cut in Knob



No tie wires

Can't pull off.

Can run wires in any direction.

Send for Sample

Price per M $20.00

Wholesale Telephone Supplies

The W. G. Nagel Electric Co.

TOLEDO, OHIO

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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

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WILL DO IT!
A MAGNETO MULTIPLE
SWITCHBOARD

100 Line Position.

Gives up-to-date equipment without changing telephones. Will work common return, grounded or metallic lines.

THE ONLY SUCCESSFUL MAGNETO LAMP SIGNAL BOARD.

Sterling Electric Co.

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Do You Who Have Money Invested

in telephone systems realize that you are giving away about 25 per cent. of your service where you sell it on the privilege plan? One-fourth of the salaries of your operators, one-fourth of your maintenance expense, besides one-fourth of the many other expenses of your exchange, are donated to the deadheads, and your service is probably one-quarter less efficient. It's a vital question; treat it as such; and when you are ready to apply the remedy, don't forget that we can put up the prescription.

The Stroud System of Measured Service

THE CONTROLLER CO. OF AMERICA
Monadnock Building, Chicago
Woman's Magazine Building, St. Louis

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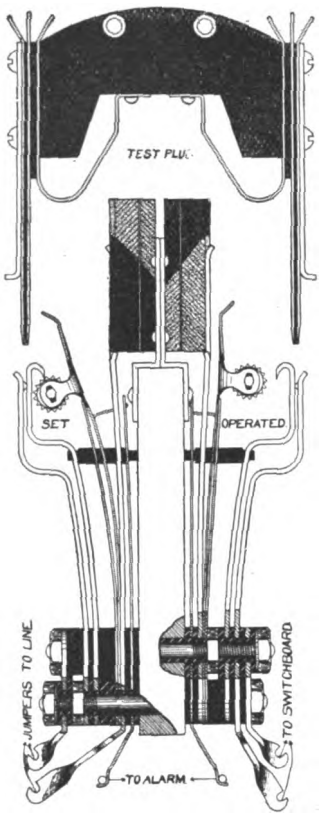

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COOK'S SELF SOLDERING PROTECTOR

PATENTED NOVEMBER 29, 1904.

COOK'S NO. 444

I OWN OR CONTROL ABSOLUTELY THE ONLY PATENTS ON SELF-SOLDERING PROTECTORS WHICH HAVE ISSUED, AND UNDER WHICH APPARATUS IS BEING MANUFACTURED.

I invite a thorough investigation both of the patent situation and of the superiority of my devices. I am ready to furnish information or fill orders, guaranteeing not only satisfaction but protection, both legal and electrical.

Good business judgment demands that you use only protective apparatus on which broad patents HAVE BEEN GRANTED—not that on which an uncertain patent is pending.

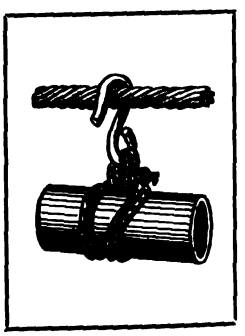
Frank B. Cook. INVENTOR AND MANUFACTURER,

238 W. LAKE STREET, CHICAGO.

MARLIN CABLE HANGERS

The Reason Why

The buyer should buy our No. 3 Marlin Cable Hanger. Because it costs no more than makes that are shorter-lived and unreliable. We guarantee the material and the expected service of our Hangers—no one can do fairer—and our present big output is the result solely of the lasting reliability of our No. 3 Hangers. They never fall back on the guarantee back of them. We recommend the use of our best grade, the No. 3, as the truest economy. Guaranteed to be according to specifications of the A. T. & T. Co., made of three-strand Houselin, the best we can get, made of genuine selected American hemp, hand picked, hand laid, and specially well tarred. Hooks are No. 9 spring steel wire, **galvanized after being formed.** Practically rust-proof. Will stand a strain of 100 lbs. without opening. Write to-day for complete price-list of our three grades and various sizes.



NATIONAL TELEPHONE SUPPLY CO. - CLEVELAND, O.

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FARR TELEPHONE AND CONSTRUCTION SUPPLY CO., 118 and 120 W. Jackson Blvd., CHICAGO

MORGAN & WRIGHT TAPE IS GOOD TAPE

Possesses exceptional adhesive qualities.
Will not dry out.
Unrolls smoothly and easily.
Has uniform insulation.
Is peculiarly free from pinholes.
Has high insulation resistance.
Is capable of withstanding extreme heat much longer than is required by the most severe tests.
Possesses an uncommonly high percentage of insulation composition.

Samples and prices furnished on request.

MORGAN & WRIGHT CHICAGO

NEW YORK SAN FRANCISCO

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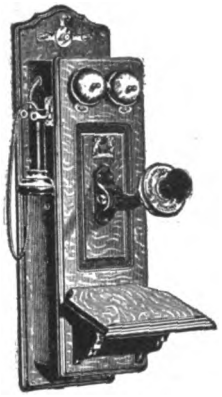


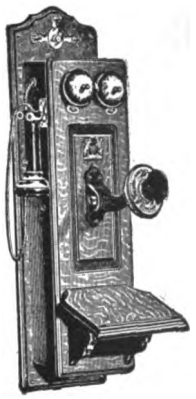
No. 99 Series or Bridging.

"TELEPHONES"

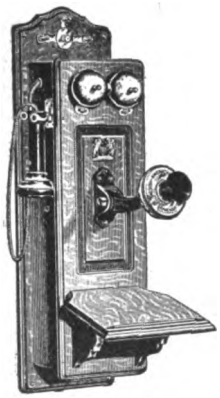
As we manufacture and assemble them, demonstrate and perpetuate our right to the claim "that we lead them all."

OUR APPARATUS

is the result of time, energy, brains, experience, hard work and money, and has resulted in placing our equipment distinctly at the head of the list. Our product deserves your recognition. Prices and apparatus right. Your inquiries solicited.

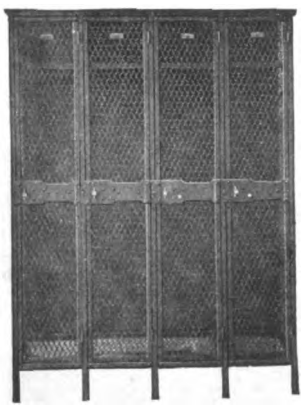


No. 99 Series or Bridging.



Swedish-American Telephone Co.

CHICAGO, ILL.



LOCKERS

or material closets made by us of Expanded Metal or solid Sheet Steel insures positive security to the contents.

Have points of superiority over all others

We make metal shelving and inclosures

Write for Catalogue.

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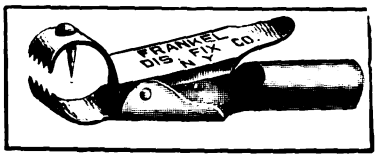
1010 Ridge Av., PHILA.



Throw away that knife! Stop scraping and cutting off insulation. Save time, money and temper. Use the

FRANKEL

Patent Wire-Testing Clip

The teeth hold the wire, the pin pierces the insulation, and makes a positive test connection. Write to-day for a sample dozen or a hundred on trial.

In 1 Dozen lots, 12½c. each
" 100 " 11c. "
In 500 lots, 10c. each
" 1,000 " 9c. "

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718 BROADWAY Electrical Dept. **N. Y. CITY**
ASK YOUR SUPPLY HOUSE FOR THEM.

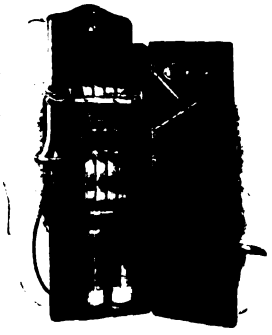
A Physical Impossibility.

Some people cannot hear or talk over a telephone in a noisy location. No one can carry on a satisfactory telephonic conversation under such conditions. Our

SOUND PROOF BOOTHS

prove the solution of the problem. We'd like to explain further.

W. S. SEAMAN & CO.
216 E. Water Street, MILWAUKEE, WIS.



If you can't ring everybody on your country line with this, your wire is down.

Write us.

Eastern Telephone M'f'g Co.
WEST CHESTER, PA.

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VOLUME 10 *SATURDAY, DECEMBER 10, 1904* *NUMBER 24*

A STUDY IN TRAFFIC.

By the Traffic Manager.

IT may perhaps seem forced to designate a telephone company as a transportation company, but in all essential points a telephone company is as much of a transportation company as one which operates railway or steamboat lines. A railway uses a track upon which trains of cars are drawn by means of a locomotive, that transfers from place to place loads of passengers and merchandise collected from various sources. A telephone company employs a track in the form of a wire, which extends from its central office to its various subscribers. Upon this track no physical locomotive actually runs; but, on the other hand, the telephone company collects loads of goods in the form of messages, which it transports over its track by means of the impalpable though no less real energy of the electric current.

For a railway manager to try and prosecute his business in ignorance of the number and size of his locomotives, and their capacity to haul loads, or the quantity of merchandise and passengers which the country through which his road extends can offer, would be the height of folly, and it is equally foolish for a telephone manager to attempt to operate an exchange in ignorance of the number and kind of subscribers which he serves, the quantity of traffic which they will daily originate, the capacity of his switchboard, the ability of his operators to handle the business delivered to them, and the loading to which his trunk lines will be subjected.

To secure the most successful operation of a telephone plant, the general manager must be thoroughly informed as to the following essentials:

First. The amount of traffic to be handled. Second. The possible capacity of the various pieces of apparatus whereby intelligence is transmitted. Third. The efficiency at which the plant from time to time actually performs it work. Fourth. The desirable efficiency, namely such a rate of loading as is on a whole found to be commercially the most advisable.

Evidently the answers to these questions can only be obtained from extensive experience. For, *à priori*, it is utterly impracticable to predict how many messages a subscriber will originate, or the number of calls that a trunk line may handle and still provide satisfactory service, or the load at which the various operators can work in a manner to win the subscriber's approval. So it is only by comparison of much experience, derived from many sources, that trustworthy information of this description can be obtained. Therefore, the traffic study is the most important problem presented to the general manager, and one which is never solved, for the progress of to-day is useful chiefly in indicating the improvement which may come to-morrow.

DETAIL SHEET_____ OFFICE

HOURS	ORIGINATING CALLS POSITIONS NO.							IN TRUNK CALLS POSITIONS NO.						
	1	2	3	4	5	6	TOTALS	1	2	3	4	5	6	TOTALS
12 TO 1 AM														
1 - 2 "														
2 - 3 "														
3 - 4 "														
4 - 5 "														
5 - 6 "														
6 - 7 "														
7 - 8 "														
8 - 9 "														
9 - 10 "														
10 - 11 "														
11 - 12 "														
12 - 1 P.M														
1 - 2 "														
2 - 3 "														
3 - 4 "														
4 - 5 "														
5 - 6 "														
6 - 7 "														
7 - 8 "														
8 - 9 "														
9 - 10 "														
10 - 11 "														
11 - 12 "														
TOTALS														
POS. HRS.														
LINES														
CALLS PER LINE														

Fig. 1.

The actual originating business which the subscribers offer is the starting point of such investigation. It is essential to catalogue or index the various subscribers from all view-points, and determine the number of residence and business substations. The latter it is well to subdivide into various classes, such as newspapers, theaters, doctors, grocers, butchers, laundries, wholesale and retail houses of various kinds, lumber dealers and many other subdivisions which will naturally suggest themselves to the reader. Then the facilities which are supplied to each group should be registered, such as the relative proportion of party lines to single lines, and the various proportions of the different numbers of parties with which the party lines are loaded, also the relation between measured service substations and those upon a flat rate. Finally a description of the substation equipment is desirable, as indicating how many desk sets, extension sets, coin boxes, measured service meters, etc., are required to supply the demand of the various subscribers.

Where more than one central office exists in an exchange, such an inventory should be made for each one independently, and then these statistics may be tabulated as percentages of the whole, in order that, when complete, the manager may constantly have before his eyes a complete catalogue of the facilities with which the subscribers are working. Such information should be supplemented by a description of the central office and trunk line equipment, so arranged that constantly the relation between the subscribers and their facilities may at once be presented. It is often convenient to arrange such a description by plotting upon

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a sheet of profile paper; this may conveniently be placed upon a pair of rollers contained in a glass case, in such a way that the sheet may be rapidly rolled to and fro so that the eye may traverse all of the curves, which indicate from time to time the relation between facilities and business. A system of colored inks and a combination of dotted and dashed lines may be used, which, when once memorized, convey at once to the eye the desired relationship. A record of this description soon becomes not only an invaluable history of the business in the past, but an unerring index of the probable growth which the future will demand.

The next operation is to ascertain the business which the subscribers offer, and concurrently the rate at which the various portions of the plant are working. Continued records of this kind soon reveal the desirable loadings to which the various parts of the exchange should be subjected in order to attain the best efficiency. Further, comparison of such information with similar data collected from traffic studies of other exchanges enables a manager to at once find out whether his apparatus is running under the most advantageous conditions, and if not, to point out a desirable remedy. It is highly improper to assume that the unit loads which studies of this kind reveal are final; they are not, they are simply statements of what the past has done, and indexes of what should be demanded in the future. They are useful in three ways.

First, to see whether from time to time the various parts of the exchange are working at such rates as experience has indicated advantageous, and if not, show what changes will produce an improvement.

Second, to determine whether the plant, as a whole, is working with harmonious co-operation; for the complexity of a telephone exchange is so great, and its organization so sensitive, that no one part can be seriously under or overworked without reacting upon all the other groups, and on the whole seriously reducing the efficiency.

Third. Telephony is constantly evolving new methods in both apparatus and in operating; and, unless these are tested in the inexorable mill of experience, it is impossible to tell whether such devices result in good or in evil.

In certain classes of transportation business records of traffic become automatic. Thus with railway and steamer lines, freight is prepaid by weight and distance, and a consultation of the waybills immediately indicates the business which is handled from day to day, and the profits which accrue. The passenger record is easily obtained by consulting the number of tickets which are sold, as this indicates at once the number of passengers carried and miles each is hauled, and the receipts derived therefrom.

In a telephone exchange, however, even when equipped with measured service, statistics of traffic do not automatically record themselves, so special investigations are from time to time essential in order to obtain the data required. The customary method requires a count to be made of the number of originating calls and trunk messages which are handled at every switchboard during a given twenty-four hours. The ordinary practice is to make a count of this kind monthly, and in addition upon such holidays and other special occasions as may seem to demand extra investigation. The earliest method adopted was to provide each operator with a wooden peg, similarly shaped to the ordinary plug, so that it might be placed in a jack. The plug is provided with a head which will prevent it from entering too far and becoming lost. The operators are taught to use the set of 100 multiple jacks nearest in front of them. The count is usually commenced at midnight of a given twenty-four hours, and all operators instructed to place the peg in the zero jack of the bank, and then move the peg along one jack, for every call that is received, the moment the subscriber's signal is actuated. At the end of each

Traffic Record. **X. Y. Z. TELEPHONE CO.**

DATED..... **Weather**..... **Summary Sheet.**

Item No.	ITEMS	Derivation of Items.	DESIGNATION OF OFFICES. Office A. Returns	Office A. Difference from Last Count.	Office B. Returns	Office B. Difference from Last Count.		Totals.	DIFFERENCE FROM LAST RECORD Greater.	Less.
	SECTION A CIRCUIT AND STATION STATISTICS									
1	No. of Flat Rate Stations.....									
2	" " Measured Rate Stations...									
3	" " Single Line " ...									
4	" " Party " ...									
5	" " Residence " ...						(Form to be made wide enough to accommodate as many Offices as may be desired.)			
6	" " Business " ...									
7	" " Pay " ...									
8	Total Stations									
9	No. of Lines									
10	Average Stations per Line.....									
11	No. of Incoming Trunk Circuits...									
12	" " Outgoing " " ...									
13	" " Toll " ...									
14	" " Positions A									
15	" " " B									
16	" " " Toll									
17	" " Cords Circuits A.....									
18	Calls per " " A.....									
19	No. of " " B.....									
20	Calls per " " B.....									
	SECTION B ORIGINATING TRAFFIC									
21										
22	(Form to be made long enough to accommodate as many Sections as desired.)									

Fig. 2.

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hour a supervisor visits the board, and upon a proper blank makes record of the number of the jack in which the peg stands, and then replaces it to the zero hole, thus securing a record of the number of calls which have originated in each position during the hour which has preceded. Owing to the use of the wooden peg studies of this description have been termed "peg counts." Many methods of taking such records have been proposed as improvements on the peg.

The simplest is, perhaps, the substitution of some mechanical device, such as a street car register, bicycle cyclometer, or a revolution counter. Then it has been proposed to equip each cord with some sort of a mechanism which should automatically register every time that it was used. But as the operators are likely to hold the cords in their hands, no such device has as yet been successful.

For long distance and toll line switchboards, or in cases where the operators are required to make a ticket for each call, the traffic record becomes very largely automatic, and may be collected at any time by counting the number of tickets which have been used. When lines are supplied with measured service meters located at the exchange, an hourly inspection of such meters will at once reveal the desired statistics, but, if the toll counters are placed at the substations, it would be an impossible task to inspect each.

Experience has shown that it is essential that operators should not be aware of the number of calls which other operators have recorded, or otherwise those that are lazy and inefficient will compare notes with the more industrious, and stuff the record to such an extent as to make it unreliable and untrustworthy. It is often thought that the labor of making a record of this, kind would inflict such a burden upon the operators as to interfere with proper service. This is not the case, for presently the operators become so experienced that the subscribers never know that a peg count is in progress. And furthermore, the spirit of emulation is soon so cultivated that the operators become desirous of having peg counts taken, in order that from time to time their improvement may be noted, and brought to the attention of the company.

In any method of collecting statistics, the supervisor is supplied with a blank, a customary form being shown in Figure 1, and opposite each hour a record of the number of originating calls in each position is placed. When the count is finished these records are transmitted to the traffic department, and placed in the hands of employees equipped with tabulating machinery, such as slide rules, adding machines, book typewriters, etc., whereby the records from each office are quickly collected and tabulated in such a manner as to be useful in determining the loading to which each portion of the exchange is subjected. Many methods for arranging data have appeared from time to time, but the present tendency is towards a method of exhibiting the results of each position in each office in detail upon a sheet precisely the same as that shown in Figure 1. Then a summary sheet is made containing each item for all offices, so collected as to present a complete and comprehensive record of the whole. Finally the various detail sheets, headed by the summary sheet, are collected and bound in book form, making a complete traffic record.

A blank suitable for a summary sheet is shown in Fig. 2. Each item is prefixed by a given number indicated in the extreme left hand column, the next column shows the various items, which are subdivided into nine sections; the next column shows the arithmetical derivation of the items; that is to say, the arithmetical method whereby the various quantities in the other columns are obtained.

The rest of the table is made of sufficient size to devote two columns to each of the subsidiary offices, the first one of which shows the returns obtained from each office on the particular day of the peg count; the second shows the difference, whether greater or less, than the preceding count. The table may be either extended or contracted so as to give any desired number of offices, and any of the sections may be omitted or curtailed to such a degree as the business of the particular exchange under consideration shows to be most desirable. Lastly, at the extreme right a column is placed giving the totals for all offices, and the corresponding differences, giving a comparison with the preceding enumeration. To economize space the various items which are suggested for column two are shown below. By this means any manager may readily arrange the account to suit his convenience.

Sec. A. Circuit and Station Statistics.

Number of Flat Rate Stations.
" " Measured Rate Stations.
" " Single Lines Stations.
" " Party Lines Stations.
" " Residence Lines Stations.
" " Business Lines Stations.
" " Pay Stations.
Total Stations.
Number of Lines.
Average Stations per Line.
Number of Incoming Trunk Circuits.
" " Outgoing Trunk Circuits.
" " Toll Circuits.
" " Positions A.
" " Positions B.
" " Cord Circuits A.
Calls per Cord Circuits A.
Number of Cord Circuits B.
Calls per Cord Circuits B.

Sec. B. Originating Traffic.

Number of Calls.
Average Number of Calls per Line.
" " " " " Station.
" " " " " Business Station.
" " " " " Residence Station.
" " " " " Pay Station.
Number of A Positions.
" " A Operators in Busy Hours.
" " Calls per Position, Average.
" " Calls per Position, Maximum.
" " Calls per Position in Busy Hour, Average.
" " Calls per Position in Busy Hour, Maximum.
" " Calls per Operator in Busy Hour, Maximum.
" " Calls per Operator in Busy Hour, Average.
" " Operators, Hours.
Hours per Operator.

Sec. C. Trunk Traffic.

Number of Out Trunk Calls.
" " In Trunk Calls.
" " Out Toll Calls.
" " In Toll Calls.
Total Toll Messages.
Number of Out Trunk Calls per Circuit, Average.
" " In Trunk Calls per Circuit, Maximum.
" " In Trunk Calls per Position, Average.
" " In Trunk Calls per Position, Maximum.
" " In Trunk Calls in Busy Hour.
" " In Trunk Calls per Position in Busy Hour, Aver.
" " In Trunk Calls per Position in Busy Hour, Max.
" " B Operators in Busy Hours.
" " B Operators, Hours.
Hours per Operator.
Number in Trunk Call per Operator, Hour.
Per Cent. Out Trunk Calls to Originating Calls.
Total Messages.

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SEC. D. STATISTICS OF LABOR.

Total Operators.
Total Operators' Hours.
Other Employees.
Other Employees' Hours.
Total Employees, Hours.
Messages per Position, Hour.
Messages per Operator, Hour.
Messages per Employee, Hour.
Hours per Employee.

SEC. E. STATISTICS OF FLAT RATE SERVICE.

Number of Stations.
" " Lines.
Stations per Line, Average.
Total Calls.
Calls per Line, Average.
Calls per Station, Average
Number of Positions.
Calls per Position, Average.
" " " Maximum.
" " " in Busy Hour, Average.
" " " in Busy Hour, Maximum.
Number of Positions, Hours.
Calls per Position, Hours.
Number of Operators.

SEC. F. STATISTICS OF MEASURED SERVICE.

Number of Stations.
" " Lines.
Stations per Line, Average.
Total Calls.
Calls per Line, Average.
Calls per Station, Average.
Number of Positions.
Calls per Position, Average.
" " " Maximum.
" " " in Busy Hour, Average.
" " " in Busy Hour, Maximum.
Number of Position Hours.
Calls per Position Hours.
Number of Operators.

SEC. G. STATISTICS OF PARTY LINE SERVICE.

Number of Stations.
" " Lines.
Stations per Line, Average.
Total Calls.
Calls per Line, Average.
Calls per Station, Average.
Number of Positions.
Calls per Position, Average.
" " " Maximum.
" " " in Busy Hour, Average.
" " " in Busy Hour, Maximum.
Number of Position Hours.
Calls per Position Hours.
Number of Operators.

It is useful to complete the record by printing it with a book typewriter upon tracing muslin; then the cloth so prepared may be placed in a blue print frame, and as many copies quickly obtained as is desirable. It is advantageous to prepare so many copies of each peg count as may be necessary, so that each manager and all of the principal officers can be supplied with the information which it contains. Then from time to time a meeting of the managers and other officers is convened to discuss the results which the peg counts have shown. From such conventions the attention of the various officers is forcibly directed to the actual results which the service shows, and many highly valuable suggestions are elicited that look toward an improvement of the business.

Some exchanges have found it useful to plot the results of the peg count upon section paper; and, while this does not give so searching or so minute an analysis, it depicts in a manner that appeals more forcibly to the eye than any possible tabulation of figures.

Examples of this kind showing the results obtained in different exchanges will be illustrated in a future article, in which information gathered from companies operating in cities of various sizes will be given.

THE PRIVATE BRANCH EXCHANGE AS A BUSINESS BUILDER

ARTICLE V. CIRCUITS AND THEIR OPERATION.

BY A. DALLAM O'BRIEN.

THE connecting cord circuit is subject to considerable modifications in boards of the various manufacturers, and no particular circuit can be said to be a standard. With most methods of wiring the cord circuit, two supervisory signals are employed, in order that either the calling or called substation may be able to signal the operator. This, however, does not always hold, as in some cases, in operating private branch exchanges, the switchboard operator is governed entirely by the supervisory signal in the answering cord; or, in other words, the duration of the connection is wholly dependent upon the calling substation.

The circuit shown in Fig. 4 is adapted for use with common battery switchboards and differs from the circuit described in a previous article only in the fact that in the former case a repeating coil was employed in each cord circuit, while in this case the repeating coil is replaced by a retardation coil, the remaining portions of the circuit being identical in the two cases. The retardation coils, which are used for this work, consist of a closed iron core, which is usually made up of a bundle of small iron wires, upon which are wound two coils, each having a resistance of from 15 to 20 ohms. The number of turns in these coils is comparatively speaking, large, and their effect is to offer a high impedance to the currents caused by the varying potential at the buss-bars at the branch exchange and to prevent cross talk or interference when two or more connections are made through the board at the same time. Probably one of the most important considerations, in connection with a common battery branch exchange, is the means to be employed for furnishing the current to the switchboard.

This may be accomplished in a number of ways. In some of the earlier installations the battery was furnished to the buss-bars, which were mounted on the switchboard connecting rack

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from a group of Fuller cells located at some convenient point within a few feet of the switchboard, and, to some extent, this method of supplying current is still employed. In recent installations it has been the common practice to replace the Fuller cells by a small storage battery, which has a discharge capacity large enough to run the board for a period of twelve hours. These batteries must receive their charge from some outside source of current, and this may be readily accomplished by using one or more pairs of wires from the central office and charging the batteries at the branch over these wires.

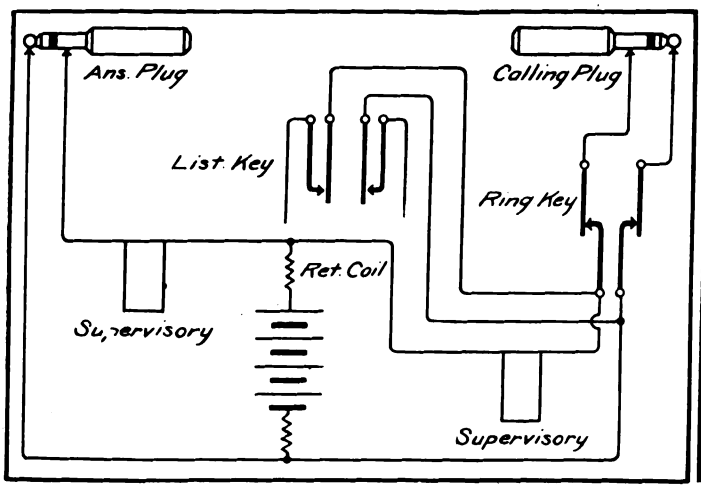

Fig. 4.

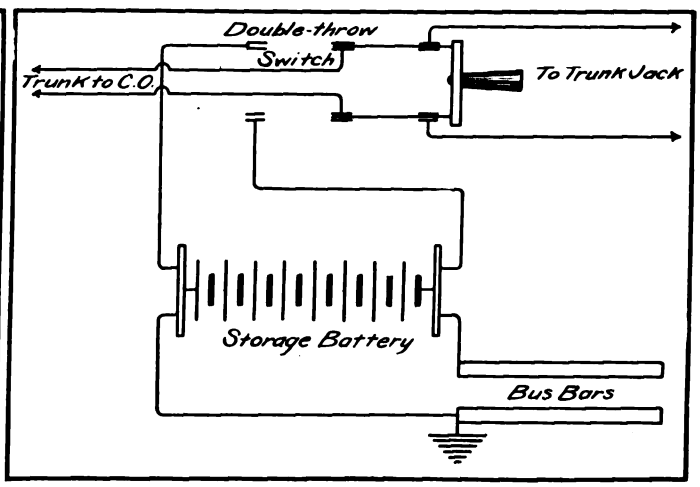

Fig. 5.

The number of pairs that are necessary for this purpose in any given case will depend upon the size of the conductor; the distance from the central office to the branch exchange and the voltage which it is desired to obtain at the branch. It can easily be seen that cases may arise where the distance from the central office to the branch becomes so great that an excessive number of conductors would be required to charge the batteries and at the same time prevent too great a drop in potential due to the resistance of the line. In such cases the branch batteries may be charged from a direct current electric light or power circuit, sufficient resistance being inserted in the circuit so as to reduce the voltage of the current passing through the battery to the desired value. While this method entails a considerable loss of power, yet at the same time it may often prove less expensive than would the employment of a sufficient number of conductors, in order to charge the batteries from a central office. Where the branch exchange is an unusually large one, it may prove advisable to install either a motor generator set or a small gas engine and generator and thus charge the batteries direct.

With small boards, the operator is very often able to handle all the connections which must be made through the board, and also provide the ringing current by using a hand generator which is wired to the ringing keys, but it is obvious that where the volume of traffic which is handled through the board is at all large that manual ringing is out of the question, and in the modern installation where an operator is employed this condition is almost invariably obtained. The general practice for furnishing the ringing current is to supply it to the branch over a pair of conductors from the central office, both wires of the pair being connected to the non-grounded side of the central office source of ringing current, the return being obtained by means of a ground at the branch exchange. In addition to this source of supply, provision is invariably made so that a hand generator may be used in case of an emergency, due to an accident, to the power lead from the central office.

Where the branch exchange is one that is not used to any great extent during the night, the charging of the storage batteries may be easily and economically accomplished by using the trunk lines between the central office and branch as a medium over which to send the charging current, this, of course, being done during the night. It is only necessary where this is done to provide a switching device, both at the central office and at the branch, so that the trunk lines may be connected to the proper sources at either end.

The method in which this may be accomplished by using a trunk line as the conductors for the charging current is illustrated in the diagram in Fig. 5. The incoming trunk line from the central office is connected to the central contacts of a double throw switch, the remaining pairs of contacts being connected to conductors leading to the storage battery and to the trunk jack, respectively. The operation of this circuit is readily apparent from the diagram.

As regards the traffic operation of switchboards of this character, there is little that need be said from the branch exchange end, as all the complication, if it may be dignified by that name, is placed upon the central office. It is, however, a most excel-

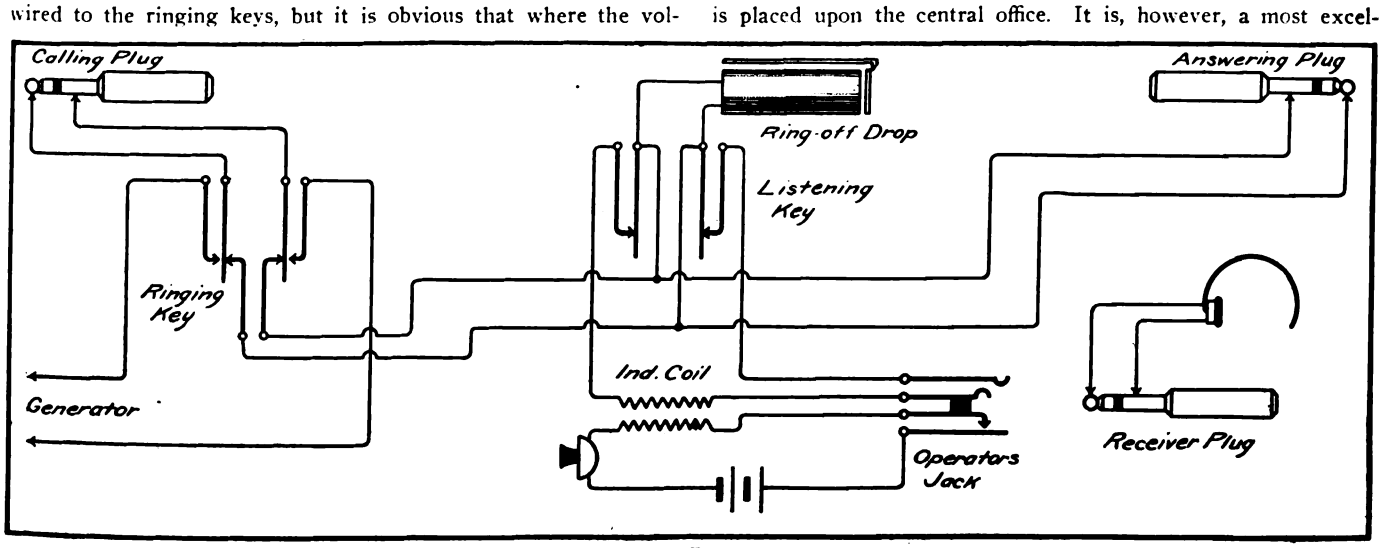

Fig. 6.

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lent practice where a branch exchange is equipped with ten or more trunk lines to the central office to divide these lines into two groups, one of sending and one of receiving trunks, and to impress upon the operator at the branch exchange that under no circumstances is an originating call at the branch for a point reached over a trunk line to be completed over a receiving trunk unless all of the sending trunks are busy; and in the same way, the operators at the central office should be instructed that upon receiving a call for the branch exchange the sending trunks should be tested first and one of these used, if possible, and if all are found busy, the receiving trunks may be tested until an unused trunk is discovered.

By this means the central office operators are not often called upon to test a large number of trunks before finding one which is disengaged, and thus time is saved where time is valuable.

The branch exchange operator is usually fortunate in not being burdened with the necessity of making checks and keeping a record of the calls which pass through the switchboard, except on calls which are handled over trunks to the central office, and in such cases, a record is only made for the purpose of furnishing either a check upon the business transacted from the branch substation or else furnishing a check upon the number of calls completed over the lines of the telephone company.

On the part of the company, it is necessary for the efficient operation, for this class of board, that an accurate record should be kept of the number of originating calls at the branch exchange, which are handled over the trunks to the central office, and it is also important that a record should be kept of the number of trunked calls for the branch exchange, which are delayed, due to the fact that all of the trunks are busy. With this information at hand, the growth of each particular installation may be carefully and accurately followed, and thus the company be in a position to intelligently convince the subscriber, to the branch exchange, of the necessity of greater trunking facilities between the branch and the central office. Where the magneto type of switchboard is used for private branch exchange work there are few, if any, complications which arise.

Each substation is supplied with its own local battery, usually dry cells, and the instruments are directly connected to the switchboard jacks, the line signal usually being a high impedance drop which is permanently bridged across the line. A typical cord circuit for this type of installation is illustrated in Fig. 6. In this arrangement the calling plug is equipped with a ringing key and the connecting cord circuit consists of a perfectly straight circuit between the two plugs. A listening key is bridged permanently across the cord circuit and a high impedance ring-off drop connected through the long springs of the key. The operation of this circuit will be easily seen from the diagram.

The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

ALLEGED DISCRIMINATION.

THE Twin City Telephone Company has brought suit for an injunction restraining the city of St. Paul, Minn., from further destruction of poles and wires of the company along Hague avenue. In its answer to the proceedings for a temporary injunction and the call for an answer why the injunction should not become permanent the city cites the various orders of the common council, the correspondence between the city officials and the company, the orders for the building of the conduits for the wires, the actions taken by the residents of Hague avenue and the dangers and inconveniences attendant upon the maintenance of the poles and wires.

It is stated in the answer that the cross arms and wires are almost directly in front of and on a level with the windows in the upper stories of the dwellings adjacent to the poles and that on account of the wind storms which are so common in St. Paul and the fact that the wires are constantly charged with electricity the people living in that vicinity are in constant danger of the poles being blown onto the house or into the street. In windy weather the wires make a loud, disagreeable and annoying noise which can be distinctly heard for a long distance, and it greatly disturbs the people living on that street.

The company in its reply to the answer states that the wires and poles in question were erected because the company believed in the force and intent of the ordinance allowing them to be placed there and that as their removal would cause great additional expense to the company the action of the council in so ordering was unreasonable.

The toll lines on the poles were being used to their full capacity and with slight repairs would have answered the purposes of the company for ten years.

The defense is made that the conduit system is too costly and that it is not necessary west of Dale street, a part of the city that is sparsely inhabited. If the company is required to place the wires underground, it ~~is said that~~ the work could not be done in less than six months, and that if ordinary delays are to be taken into consideration, two years would be a reasonable time in which to construct the conduits and put the wires underground for the half mile.

The company further says that if the city possesses the power to order the wires of the company underground on Hague avenue, it also has the right to order wires underground in other sections of the city, and if such is the case, it would be useless for the company to attempt to maintain its business in St. Paul. Such action is declared to be an unwarranted discrimination as between the Twin City and the Northwestern companies, and the declaration is made that if the city persists in its present attitude it will be necessary for the Twin City Company to withdraw from St. Paul and leave the field to its competitor.

ACCOUNTING IN A TELEPHONE CASE.

MAYOR P. J. LUCEY, of Ottawa, Ill., has filed a bill of complaint against the Streeter Telephone Company and certain of its members. He alleges that the cost of constructing the exchange was approximately $125,000, for which amount bonds were issued and deposited with the American Trust and Savings Bank, of Chicago, and that the financial interest of the complainant in the company amounts to $10,000. He alleges that subsequent to depositing the bonds with the Chicago bank, the president and vice-president obtained possession of a large proportion of them, some $115,000, and now threaten to sell or dispose of them, which act the complainant says would be greatly to his injury. The company, he says, has no substantial indebtedness and does not owe either the president or vice-president anything. To restrain them from making the sale threatened and prevent the injury to his interests he asked and was granted an injunction against the defendants. He prays for an accounting on the part of those who have possession of the missing bonds.

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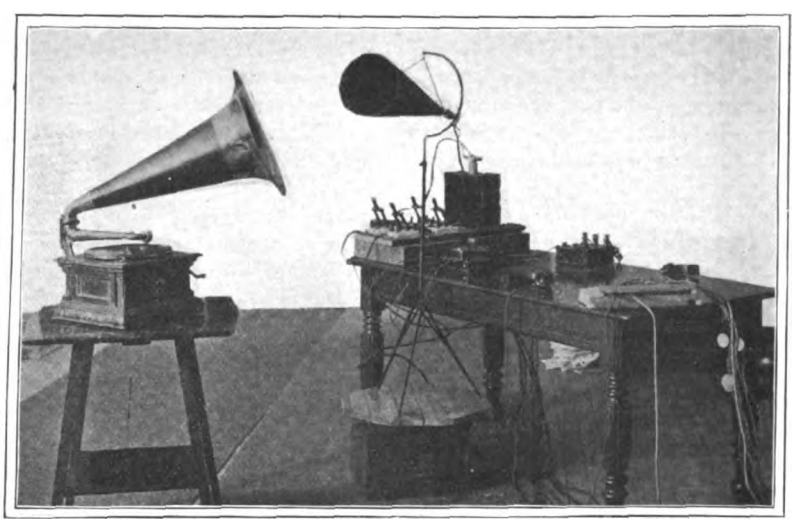
HOW THE KEYSTONE FURNISHED THE ELECTION RETURNS

By Frank C. Ogden.

THE Keystone Telephone Company in conjunction with the *Evening Telegraph*, of Philadelphia, made a very unusual arrangement to distribute the election returns, and so successful were the methods employed that the subscribers to the service knew the results in many instances ahead of all others relying upon other news agencies. This triumph of the Independent company was brought about by a thorough investigation of all methods heretofore utilized and then from the best of all the results herewith described were attained. Compared with the other means employed by other companies the Keystone's method was simplicity itself and enabled a service to be given that was quicker and better than could have been possible with the complicated circuits and apparatus employed elsewhere.

The general arrangement of the distributing apparatus is shown in the accompanying illustration, which will give a good idea of the scheme evolved.

Numerous tests were made to settle upon the best transmitters and the best arrangement of transmitters, and finally an American transmitter was selected and the best results obtained by mounting it on the end of an ordinary phonograph recording horn, with the back of the transmitter open. The transmitter used was one out of regular stock (in fact, it had been in service in a subscriber's office). In the preparations for this special service it was not found necessary to employ any instruments or materials that were not in ordinary use by the Keystone Company except the phonograph horn and a large Victor talking machine that was used to send out music over the circuits, so that there would be no tiresome waits between bulletins.



Apparatus Employed to Distribute Election Returns by the Keystone Telephone Co., of Philadelphia.

The bulletins were received over special wires from the office of the *Evening Telegraph*, which paper placed its entire news-gathering facilities at the company's disposal. The bulletins were written in duplicate, one copy going directly to the man operating the transmission circuit, the other copy going to the typewriters for duplication.

The circuits were so arranged that all the returns and music were sent out from one transmitter to all subscribers that wished to hear the returns. There was absolutely no relaying of bulletins. In addition to the lines in Philadelphia, connections were made on the same circuit to Wilmington, Delaware; Trenton and Atlantic City, New Jersey, and the intermediate towns, over the wires of the Keystone State Telephone Company.

As a matter of precaution, two circuits were prepared, differnections were made to Baltimore, Md.; Harrisburg, Pa.; Atlantic City, N. J., together with quite a number of the intermediate towns, in addition of several hundred stations in Philadelphia. The transmission was perfect, the music being especially fine.

As a matter of precaution, two circuits were prepared, differing slightly in detail. In the preliminary tests both circuits gave equally good results. On Election night, when the load came on, it was unexpectedly heavy owing to the rain (in some of our exchanges as high as 70 per cent. of the lines were connected at one time). It was found that much better results were obtained from one circuit than the other, and for the rest of the evening the same transmitter was used, it being in constant use for four hours and forty-five minutes, and was only cut out then as the service was closed at 1.45 A. M. The especial election service began at 7 P. M. and lasted for six and three-quarter hours, during which time a continuous stream of bulletins interspersed with music was sent out.

In addition to this general service, special questions were answered by the *Evening Telegraph* information bureau—Main 18-00—by twenty operators, in connection with a special information bureau located at the telephone office with a duplicate equipment with twenty operators, special arrangements being made so that each of the operators could disconnect his instrument from the switchboard, leaving the plug hanging in the air in front of an operator that did all the plugging. This arrangement made it possible for the twenty operators to be located in any part of the room. These forty operators did nothing but answer special questions relative to the election.

A return circuit was tapped on the subscribers' circuit at each exchange and brought back to a strip of jacks in the transmitting room, so that it was possible for the person in charge to tell just what the subscribers were getting and how the transmission was keeping up. In the same row of jacks was tapped the outgoing circuit so that the superintendent could listen to the transmission and be thus enabled to instantly remedy any defects which might occur.

When a subscriber asked for "election returns," he was asked whether "general" or "special" returns were wanted. If "special" were desired, connection was made with the information bureau, Main 18-00. If "regular" returns were asked for, the subscriber was plugged into a multiple jack connected with election returns circuit and left there as long as the subscriber kept his telephone off the hook. As soon as he hung up the operator disconnected him in the regular way. In this way the subscriber was not cut out of the regular service, but could get the operator at will.

In the service giving out "regular" returns there were used two receiving operators and one transmitting operator, with reliefs, the wire chief of each exchange being on duty to look after trouble.

The *Evening Telegraph* also furnished the returns to twelve of the principal theaters in the city as well as the large hotels, and at the same time displayed the news upon large canvases at seven of the most important points throughout the city.

Although it would be impossible to give the actual number of calls made and answered over the Keystone lines, yet a fair estimate would place the number in the neighborhood of 75,000. This does not include the out-of-town service or the special calls for news other than election.

The people of Philadelphia in every instance praised the methods employed and complimented the Keystone Company and the *Evening Telegraph* for the celerity shown in furnishing the returns.

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CONVENTION OF THE INTERSTATE ASSOCIATION.

THE annual convention of the Interstate Telephone Association will be held at the Auditorium Hotel in Chicago on Tuesday, Wednesday and Thursday of next week. The chief interest attaching to this meeting will be in connection with the movement that was started in St. Louis, at the convention of the National Association, looking to a merger of the two organizations. Should this movement fail, it will be the duty of every telephone operator who has the interest of the Independent movement at heart to hold the men responsible for such a failure, to a strict accountability.

THE AMERICAN TELEPHONE JOURNAL has assurances from the leading spirits in the National Association that, on their part, no stone will be left unturned to bring about such a merger; that every reasonable concession will be made to the Interstate Association, and that there will be no self-seeking. In other words, we are assured that the only conditions to be laid down on the part of the National Association representatives will be simply of a nature to insure the creation of a working national organization, one that will be useful to the telephone industry.

If the suggestions of the National Association people are met in a responsive manner by the representatives of the Interstate Association at the Chicago convention, there ought to be no difficulty in bringing about an organization under one head, and to set in motion a force that will at last secure an effective machine; that will do for the Independent industry what their national associations are doing for the light and power men, for the bankers and other representative business men of the country. These men have found their most effective weapon to be a strong, central, business-like organization, that works 365 days in the year for the benefit of its members throughout the country. Because of the results obtained by these other associations, the members everywhere have cheerfully contributed for years, both in time and money, to the work; and it requires only the most limited inquiry to find that the members of these other national associations have been repaid tenfold for their investment.

Unfortunately this cannot be said for the telephone industry; so far no tangible results have been obtained by either of the Independent organizations. However, the movement started in St. Louis at the September convention of the National Association has already shown tangible results in the way of an aggressive campaign of organization; and it is our firm belief that this movement will with proper co-operation bear satisfactory fruit.

We deem it the duty of the representatives of the Interstate convention to aid this movement in every way in their power, and to bring about at the Chicago convention unanimous action that shall result in the strengthening of this healthy activity that has set in. We have no sympathy with the prophecy that the Interstate will set its face in opposition, and that some of its leading spirits will, from motives of their own, work not for amalgamation, but for continued opposition. We prefer to believe that the Interstate people have the welfare of the industry just as much at heart as the members of the National, and that they will do everything in their power to bring about co-operation. Should this prove to be untrue, should the leaders of the Interstate Association work against union, they will, in our judgment, make it very clear that they have placed their personal interests above the interests of the Independent movement, and we shall deem it our duty to inaugurate a vigorous campaign for their extinction.

THERE MUST BE NO FAILURE TO AMALGAMATE.

The Interstate Association in the past, as we pointed out several months ago, has given no indication that it is qualified, as at present organized, for the effective work to be done. It has not taken advantage, even in a limited sense, of the opportunities that were presented to it to bring about a cohesive movement. Instead, some of its officers have worked along exactly the opposite lines, fomenting strife within the ranks, instead of training the guns on the enemy. They have put out literature that had a distinct tendency to create ill-feeling, instead of solidifying all of the Independent interests. The Association can hardly point to a single achievement looking to the welfare and betterment of the industry. It has merely given us, in and out of convention, simply talk. And none of this talk has injured the common enemy, while a great deal of it has engendered bitterness among the men who must stand shoulder to shoulder if the Independent cause is to thrive. Even the least thoughtful men in the telephone business must see that the time has arrived when the Independents are fairly driven to act in unison; when they must bring about the creation of a central organization that shall do something practical and helpful.

The action of the Bell Telephone Company makes this so clear that it hardly needs emphasizing. The enormous strength which the Independent movement has developed has finally opened the eyes of the Bell interests to the facts as they exist. The Bell people finally realize that they cannot compete on an even basis with the Independents, and that the tactics of the past no longer avail to crush out opposition. On the other hand, there is evidence that the Boston organization is training its vast machinery for a new and systematic attack on its competitors. A striking evidence of this is to be found in New York City. Here, in the offices of the American Bell Telephone and Telegraph Company, elaborate maps and statistics, showing Independent conditions within a radius of 100 miles of New York City, have been carefully compiled. The maps and statistics show the exact territory covered by every Independent company, giving the name of the company, route of line, number of circuits, whether copper or iron, grounded or metallic. There is also complete tabulated information giving the number of stations, switchboards, switchboard capacity, number of miles of aerial and underground cable, number of ducts and all other information pertaining to the physical condition of the Independent plants. There is also to be found detailed information as to franchises granted and franchise conditions, rates, long-distance lines, the financial condition of the various companies, and a list of their officers and principal stockholders. Similar information and on the same thorough and elaborate scale is, no doubt, to be found in every other division of the Bell Company's long-distance offices, so that the Boston people know almost to a dot the exact facts relating to their competitors in all parts of the country.

What a powerful weapon this is any schoolboy can realize. To meet such conditions successfully the Independents must have a similar organization, through which statistics like these can be gathered and kept available in a central headquarters. It is therefore absolutely essential that there should be one, and not two, national organizations in the Independent field, and it is the duty of the Interstate's representatives to meet the national movement inaugurated at St. Louis at least half way. There must be no failure in the amalgamation movement this time.

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WHERE IS THE FOOL KILLER?

EITHER the Bell literary workers have lost their cunning, or the Chicago police are remiss in their duty towards society, by permitting the author of the latest "Monster Telephone Combination" story to roam the streets without a keeper. In either event, the Fool Killer has some terrible work to do among the Chicago editors who gave publicity to the following in the daily papers of last Monday:

A scheme which is the preliminary step to the organization of a gigantic telephone trust which, when its alleged purpose is accomplished, will involve a capital estimated at $700,000,000 and which will put out of existence all Independent telephone manufacturing companies in the country, came to light in Chicago yesterday with the announcement that a representative of an Eastern syndicate was endeavoring to obtain options on all Independent factories in the city and obtained a few.

Similar options are being sought from all the Independent telephone manufacturing companies throughout the country, with the object of forming a big combination of manufacturing telephone interests on about the same order as other large corporations, such as the United States Steel Corporation, in order to eliminate competition in this line.

While the syndicate is said to be composed of Eastern bankers, it is believed among the Independent people that Bell interests are behind the movement. The latter theory, according to a well-known Independent manufacturer, is based upon the fact that a similar attempt to eliminate competition was made several years ago, when the Bell interests absorbed numerous Independent telephone manufacturing concerns. This plan failed, however, for as long as there were Independent telephone manufacturers in the field, it was conceded, there would be Independent operators.

Hence the only plan by which competition could successfully be eliminated was by consolidating the various Independent manufacturing plants of the country, thereby cutting off the source of supply for the Independent operators.

W. J. Hilands, of Chicago, who is said to represent Eastern parties in the movement, declared that the proposed combination had proceeded so far that there was very little doubt about its consummation. Mr. Hilands denied, however, that he was directly interested in the deal, but said he had been assisting a friend.

Why the sponsor for this charming yarn should have stopped at a little capitalization like seven hundred million dollars seems hard to determine. Seven thousand millions would have sounded ever so much bigger, and would have been quite as reasonable.

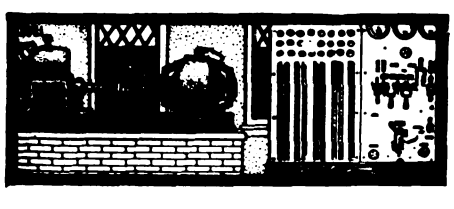
The facts in the matter are these:

A stranger called on every telephone manufacturer in Chicago, and left "option blanks," to be filled in at any old figure that might be desired. Not a single manufacturer signed these blanks, and the "promoter" was never again seen.

That was as far as the "consolidation" went and that is all the foundation for the story which was carefully telegraphed out of Chicago to every city in the country.

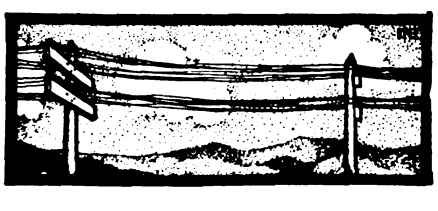
The manufacturers are inclined to look upon it as an attempt by the Bell to create another scare. And a very crude, foolish attempt it is, if the Bell was really behind it—so crude and so foolish that it seems almost impossible to believe that the Bell people had anything to do with it, for usually there is at least some reasonableness and adroitness to the matter circulated by the Bell press workers. If it transpires that it was an output of the Bell literary bureau, there ought to be a job for a new director, one who would have sense enough to know that a capitalization of $700,000,000 for the telephone factories of the United States would be about as reasonable as the incorporation of a Cobweb Trust for the Quick Aging of New Wine Bottles.

Mr. W. J. Hilands, whoever he may be, wants to be careful, or he will find himself in the clutches of the Keepers of the Foolish Minded.



QUERIES

Questions on any subject relating to telephony will be answered on this page.



FARMERS' LINE.—(469.)

We are building a new farmers' line and expect to place about 15 subscribers upon it at average intervals of about one mile. Would you advise the use of two wires instead of one and the ground? Is there any lock-out device on the market that will do for as many stations as this number? What should the resistance of the bells be, and can we use brackets instead of cross arms? G. K. T.

In reply to the first part of your query: The day of grounded circuits is fast disappearing and although there still remain a few, yet in time it will be necessary to make them metallic. This will be due to the rapid growth of trolley roads, which cause the potential of the ground to change at various points. Quite frequently the earth offers a high resistance, and therefore a grounded telephone line, if in the vicinity, offers a lower resistance and part of the current will flow over it, making the line noisy. This is particularly noticeable when a car is near. Under these conditions a line often becomes inoperative, and consequently a lot of time is lost, whereas if the circuit were metallic this difficulty would be obviated. Several lock-out devices have been placed on the market, but for such a number of stations they are complicated and would require an expert to clear trouble on them. Ringers should have a resistance of 2,500 ohms to insure good operation. Brackets might be used if no more lines are contemplated in the future, but if there is a remote possibility of running additional ones, it would be the best policy to put up cross arms in the first place and save the cost later on. The size of the arms would depend upon future business.

MANUFACTURE OF DRY CELLS.—(470.)

Please describe the process of making a good dry battery cell, giving the name and proportion of chemicals used. In soldering the zinc can, should the soldered parts be protected from the action of the electrolyte with insulating wax? U. S. R.

As dry batteries are at present very inexpensive, we believe your best way would be to purchase in the open market such batteries as you desire, without attempting to construct them yourself. It is a saving of both expense and trouble. Most dry batteries are of the so-called sal ammoniac type; the positive element is the carbon and the negative element the zinc. The electrolyte is a pasty composition containing sal ammoniac. This is usually made by causing sawdust, gelatine, cellulose, or some other similar substance, to absorb the solution of sal ammoniac. The pasty mixture is then packed around the elements, and the whole placed in a suitable receptacle. Sometimes the zinc forms a can, and thus serves a double purpose of electrode and receptacle. In other instances a paste board, paper or box of other material is employed. The various mixtures used are usually kept secret, and are the result of prolonged experience.

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IN THE OPERATING FIELD.

THE DEVELOPMENT OF LONG-DISTANCE LINES IN WESTERN PENNSYLVANIA.

THE completion of the cross-country telephone line in Western Pennsylvania, which the Pittsburg & Allegheny Company built to reach the National Telephone Company of Wheeling, marks one of the greatest improvements in long-distance Independent lines.

Through this line the Pittsburg & Allegheny will reach not only Wheeling and its immediate vicinity by an air-line route, five miles shorter than the Baltimore & Ohio Railroad, but will connect with Independent lines throughout southeastern Ohio and West Virginia. With the links that are rapidly being brought together in Ohio and Indiana it will serve as part of a through line from Pittsburg to Columbus, Cincinnati, Louisville, Indianapolis, Chicago, St. Louis and Kansas City and all the intervening towns.

It is announced that the Pittsburg-Butler line will be completed the last of this month. This will connect with the People's Telephone Company, covering Butler County, and will serve as an additional route to Northwestern Pennsylvania and Western New York. This territory is already reached by lines through New Castle, but the new route will give service through a section which has not been tapped by the Pittsburg & Allegheny heretofore.

The P. & A. Company's service has been greatly developed this summer, four new exchanges having been opened. These were at Crafton, Hazlewood, McKeesport and Duquesne, and they have added 3,000 subscribers to the list. The company now has over 15,000 telephones in service in Allegheny County. Still another exchange is to be opened shortly on Mt. Washington. This will have at the start upward of 500 telephones in service.

QUEEN CITY AGAIN TRIES TO ENTER CINCINNATI.

ARGUMENT was begun recently in the matter of the Queen City Telephone Company against the City of Cincinnati, O. The case had its origin before Judge Nippert in Probate Court, on an application by the Queen City Company, one of the Independent concerns, seeking entrance to the city, for definition of manner and mode in which it could use the streets and alleys. Judge Nippert recognized the claim of existing franchise, and defined the manner and mode of use of streets. Judge Littleford, of the Common Pleas Court, reversed Judge Nippert's finding, and the matter was carried to the Circuit Court. Powel Crosley and Provence Pogue appeared to assist C. Bentley Matthews, attorney for the Queen City Company. The two first-named are counsel for other Independent companies, the Interstate and the Fitzsimmons. City Solicitor Hunt was reinforced by Judges Peck and Outcalt, and Mr. Warrington, counsel for the City and Suburban. The full Circuit Court, Judges Giffen, Swing and Jelke, heard the argument.

ACROSS THE BORDER.

THE Privy Council at Toronto, Ont., has given judgment in the case of the City of Toronto vs. the Bell Telephone Company. It was decided that the company has the right to erect poles and to lay conduits without the consent of the municipality. The telephone company got a charter from the Dominion Government, and in the Quebec case of Regina vs. Mohr the question was raised whether the company had the power to operate in the provinces without provincial consent. The company then applied to and obtained from the Ontario Legislature another charter, in which was inserted a clause which the Dominion charter did not contain, that the company could not operate on any street without consent of the municipality. The city of Toronto tried to hold the company to this provision and litigation ensued. Justice Street gave judgment in favor of the city, but this was reversed by the Court of Appeals. The city appealed and the Privy Council has dismissed the appeal, giving judgment for the company.

INTERSTATE EXTENDING ITS LONG-DISTANCE LINES.

THE Interstate Telephone Company is constructing a new copper circuit from Sterling, Ill., to Rock Island. The work of setting the poles was completed last week, and a force of linemen at once began the work of putting up the wire. It will probably require six weeks to accomplish this work. When this line is completed the Interstate will have a direct toll line from Sterling to Rock Island. The cost of this improvement will be close to $12,000.

The company will also string a new copper circuit from Sterling to Dixon. When this work is completed the Interstate will have three toll lines running to Dixon from Sterling.

THE WINONA COMPANY PROSPERS.

THE Winona Telephone Company has grown in a remarkable way under its new management. The company owns the exchanges at Winamac, Knox and Keewana, Ind. New exchanges have also recently been put in at Hamlet and Grass Creek, and in every direction party lines have been extended over the country. When the new company took hold there were less than 350 telephones on the Winamac system. Now there are 700. On the Keewana system there were but 23 paying telephones, while now there are 125. The Knox exchange has also grown in like manner. Messrs. Samuel Tomlinson and A. B. Diggs have completely rebuilt the system, until they now have one of the most complete, up-to-date and best-arranged telephone plants in the State.

DUMMY TELEPHONE EXCHANGE.

A SWINDLING scheme on a large scale has been unearthed in New York through the fleecing of Herman Mayer, who reported to the police. Herman met a man named Henry Meyer, who unfolded to him a time-worn scheme of beating the pool rooms through a "leak" in the Western Union office and took him to a building to meet a man who was the "leak." Here Herman found a big room with a number of men busy at telephones. It was an exchange, he was told, whence the results of the races received from the telegraph company would be sent out to pool rooms. Henry introduced Herman to a "leak" and the "leak" said he could hold back the result of the race for seven minutes, but only one race a day. Later in the day Herman received a tip through the "leak" that a certain horse had won a race and he was hustled by Henry up to a room fitted up as a pool room and furnished in green with oak wood-work. Herman was so impressed that he bet $50 on a horse he didn't know. Ten minutes later he was told that he had won $90 on a steeple-chase at Gravesend. He was so delighted that he gave Henry half of the winnings and made an appointment to meet him on Saturday. On Saturday Herman drew $2,400 out of the bank to bet on a race with the expectation of winning in the same way that he

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had done previously. He bet his money, and of course failed to win. He got the police interested in the affair, and they investigated the telephone exchange that he had first visited. There were thirty-six telephones on the walls with fake switchboards. The telephone wires ran into the walls only. Only two of the telephones had a transmitting diaphragm and a few were still in their wrappings. Henry Meyer was arrested, and so was the man who acted as a "leak."

INDEPENDENT COMPANIES JOIN EASTERN TRAFFIC ASSOCIATION.

AT a recent meeting of Independent companies held at Cumberland, Md., it was unanimously voted to join the Eastern Traffic Association of Independent Telephone Companies. Represented at the Cumberland meeting, besides all the principal Independent lines of Maryland and West Virginia, including the Maryland Telephone Company, of Baltimore, and the Consolidated Company, of Fairmont, W. Va., were the leading anti-Bell companies in Western Pennsylvania, including the Pittsburg & Allegheny Telephone Company, the Pittsburg-Johnstown Long Distance, the Johnstown Telephone Company, the Tri-State Telephone Company, of Uniontown, Connellsville, and the coke region generally; the Somerset County Telephone Company, the United Telephone & Telegraph Company, which operates between Altoona and Philadelphia; the Huntingdon & Clearfield Telephone Company, which has lines in the north of Cambria County, and a number of others.

As a result of the new move the long-distance service of all the lines concerned will be controlled for an interchange of business; a uniform rate of charges will be established, and a uniform standardization of the system perfected. All moneys for long-distance service beyond the territory of the respective lines will be forwarded to the proper exchanging companies, and in many ways an improved and enlarged service will be made possible.

TELEPHONES IN FRANKLIN COUNTY, IOWA.

THERE are now operating in Franklin County 19 different telephone lines, with mileage in this county of from one to one hundred and forty-eight miles. The total assessable mileage in the county is 650 miles and the valuation placed thereon by the executive council is $23,483. This valuation brings to the county for the ensuing year at an estimated rate of 4 per cent. a total tax of $1,039. From rural telephones alone the county derives over one thousand dollars each year.

SOME INDEPENDENT FINANCIAL REPORTS

BELOW will be found reports from two groups of Independent companies which make the Bell literature on the "Danger of Independent telephone securities" seem particularly silly. The statements shown are from companies which operate in the strongholds of the Bell, and which have flourished almost beyond expectation. In the case of the Home Telephone Company, of Los Angeles, the figures indicate a development far beyond any ever dreamed of by the Bell and furnish food for careful thought by all investors. The Sunset (Bell) Telephone Company had operated for years in this territory with but varying success, and yet in one year's time the Home Telephone Company installed more telephones than the Bell had been able to install in twenty years.

The reports from the subsidiary companies of the Federal Company of Ohio, furnish another proof of the financial success which can be secured by capable management. The securities of these companies suffered in the collapse of the Everett-Moore syndicate. The Bell press bureau has for years paraded these properties as "terrible examples" in the newspapers that it has been possible to subsidize. Yet to-day the properties show recuperate powers far in excess of the Bell proteges which went down and out in the past, and almost beyond the expectation of their owners. During the past years a tremendous amount of construction has been going on among the various companies in this group, and it is only a matter of a short while when the net earnings will be far in excess of the present showings.

First Annual Report of Home Telephone Co., of Los Angeles.

Los Angeles, Cal., November 1, 1904.

To the Stockholders of the Home Telephone and Telegraph Company of Los Angeles, California:

Herewith find a statement by quarters of the earnings of your Company for its first year's business, commencing October 1, 1903, and ending September 30, 1904.

It has not been possible to give service to all who have desired to use the system, a long waiting list resulting.

Extensions are now so far advanced that residents of the Southwest and in the Business Section of the city can have immediate service; the Vernon district, Boyle Heights, East Los Angeles, Highland Park, Garvanza and Prospect Park, within thirty days.

The earnings of your Company hereafter, because of the increased number of telephones which will soon be installed, should be better than in the excellent showing made herewith.

	First Quarter ending Dec. 31, 1903	Second Quarter ending April 1, 1904	Third Quarter ending July 1, 1904	Fourth Quarter ending October 1, 1904
Quarterly Earnings	$67.633.71	$79,698.59	$86,944.39	$89,867.22
Operating Expenses, Taxes, Insurance, Maintenance and Interest on Bonds	45,274.10	47,881.08	50,469.46	51,946.00
Net earnings for quarter		31,817.51	36,474.93	37,921.22
Surplus from last quarter		5,029.61	17,867.12	34,262.05
Available for dividends, improvements or surplus	22,359.61	36,847.12	54,342.05	72,183.27
Dividends paid	17,330.00	18,980.00	20,080.00	21,580.00
To surplus	$5,029.61	$17,867.12	$34,262.05	$50,603.27

JOHN M. C. MARBLE, President. JOHN VAN LIEW, General Manager.

Comparative Statement of Subsidiary Companies of the Federal Telephone Co., of Ohio.

	Cuyahoga Tel. Co.		United States Tel. Co.		Youngstown Tel. Co.		Zanesville Tel. & Tel. Co.		Lancaster Tel. Co.	
	Oct. 04.	Oct. 03.	Sept. 04.	Sept. 03.	Oct. 04.	Oct. 03.	Oct. 04.	Oct. 03.	Oct. 04.	Oct. 03.
Gross earnings	$38,623.60	$31,798.44	$35,081.62	$32,618.02	$4,258.42	$4,049.44	$2,484.28	$2,398.20	$1,508.48	$1,378.95
Expenses and taxes	21,804.07	18,494.05	24,266.85	21,748.44	2,427.14	2,275.91	1,656.81	1,461.92	1,052.53	752.39
Net earnings	$16,819.53	$13,304.39	$10,814.77	$10,869.58	$1,831.28	$1,773.53	$827.47	$936.28	$455.95	$626.56

	Stark County Tel. Co.		Citizens' Tel. & Message Co.		Findlay Home Tel. Co.		Columbiana County Tel. Co.	
	Oct. 04.	Oct. 03.	Oct. 04.	Oct. 03.	Oct. 04.	Oct. 03.	Oct. 04.	Oct. 03.
Gross earnings	$6,015.37	$4,714.34	$1,093.00	$1,048.86	$1,783.70	$1,764.12	$3,941.17	$2,719.32
Expenses and taxes	3,037.21	2,628.75	692.05	678.44	1,263.52	1,120.34	2,742.66	3.699.27
Net earnings	$2,978.16	$2,085.59	$400.95	$370.42	$520.18	$643.78	$1,198.51	$979.95

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NEW STROMBERG-CARLSON DEVICES.

IN Bulletin No. 12 the Stromberg-Carlson Telephone Mfg. Co. are illustrating some new and interesting telephone appliances.

Figure 1 is a two-way improved ringing and listening key. The illustration shows that there are three sets of springs, which may be actuated by *a* in the center of key in the usual manner. The outer set of springs is the listening key, and when the key is thrown clear over it is locked and the operating set cut into service. The inner set of springs are arranged for ringing in such a manner that the movement of the cam closes the ringing circuit only for such a period of time as the operator desires the ringing current to remain on the line. Upon releasing the cam it automatically returns to normal position, cutting the ringing key off. The third set of springs may be actuated by means of the button shown at the left hand of the cam, under which this set may be used either for ringing, or for an order wire, or for any other work which may be desired.

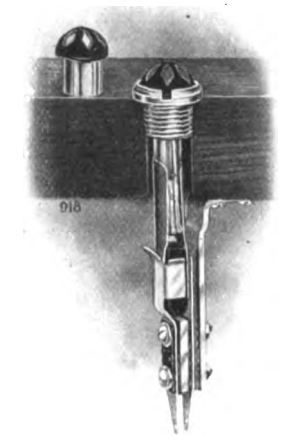

Fig. 2.—Stromberg-Carlson Lamp Socket and Cap.

Figure 2 is an improved form of lamp jack. As is shown in the illustration, the jack itself is secured to the under side of the cord sheath, and consists of a pair of parallel brass clips into which the lamp may be inserted, which form the terminals, connecting the battery circuit to the ends of the lamp filament. The opal lamp glass is inserted in brass ring, which is threaded and may be screwed into the top of the sheath. The opal is covered with a metallic cord, which is perforated to allow the illumination of the lamp to be perceived, and at the same time prevents the opal from being broken by falling plugs.

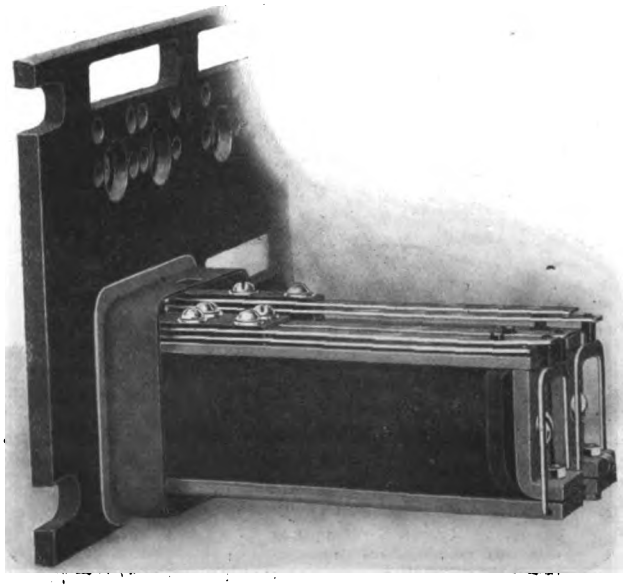

Fig. 4.—Stromberg-Carlson Double Relays Mounted.

Figure 3 is an illustration of a single relay. The coil is supported in a substantial iron frame, which forms the magnetic circuit. The armature is knife-edged, pivoted upon the front plate of the relay; and when attracted operates the contact springs, which are placed upon the top of the iron frame. The springs are platinum pointed. and sufficiently stiff to insure positive and reliable contact, having a threaded stud and pair of nuts projecting from the front end of the relay, whereby it may be secured to the entire framework.

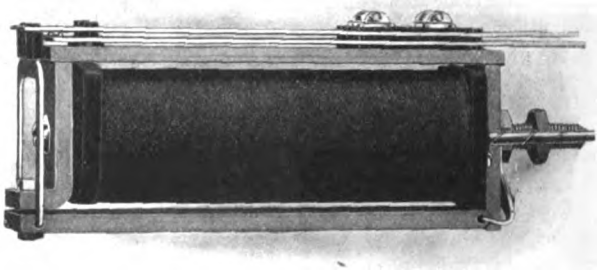

Fig. 3.—Stromberg-Carlson Single Relay.

Figure 4 shows a double relay, which to all intents and purposes is a pair of relays, similar to that shown in Figure 3, that are mounted upon a single escutcheon plate, so that they may be secured in pairs to the framework of the switchboard.

By this device each pair of relays may be used to form party-line cut-off relays or a single line.

AMERICAN ELECTRIC TELEPHONE CO., Chicago, Ill., has just issued a new catalogue in bulletin form, i. e., each subject is treated separately and bound separately, so that if an inquiry is received for any special apparatus just that bulletin which pertains to that apparatus is sent, and the inquirer is not loaded up with a complete catalogue of everything the company manufactures, although if one desires the complete catalogue the different bulletins can be bound together with a suitable cover. It is its endeavor to find out just what the inquirer wants and send the literature which bears on this subject alone.

THE T. AND A. SELECTIVE CALL CO., Geneseo, Ill., seems to have met the requirements of many rural lines from the number of orders for its selective signaling device. A successful piece of apparatus is nearly always a simple one, and this is true of this device. A relay at the central office is so arranged as to only close the circuit of a line to the drop when it is so desired, not responding to signals from one subscriber to another on the same line. The circuits over which it will operate may be grounded, metallic, or divided circuit metallic; and in each case

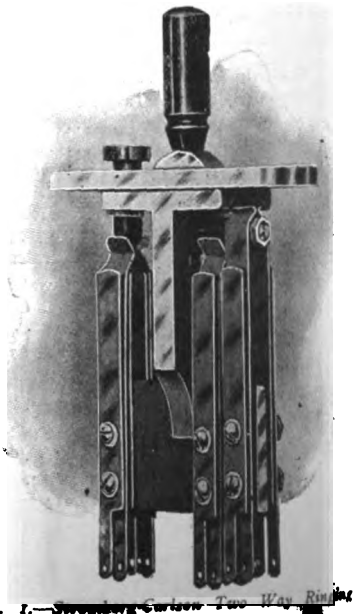

Fig. 1.—Stromberg-Carlson Two Way Ringing and Listening Key.

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

EXCEPTIONAL offer—I have a three-fourths interest in a telephone stock company owning four good exchanges and 1,000 miles of toll and farmer lines. About 1,000 telephones in operation and sufficient territory for that many more. Stock outstanding amounts to $50,000. Has earned over 30 per cent. in past two years. No competition; $25,000 cash and balance long time; low rate. Address Box 291, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 291

FOR SALE—500 Tornquist double-pole porcelain base, king of protectors, 50c each; 300 single-pole, 25c each. Address J. S. Maurer, 804 Monadnock Building, Chicago, Ill.

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WANTED—A good man for instrument work, who can also run wiring for electric lights. Address Box 287, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 287

WANTED—First-class wire chief; magneto and central energy. Must fully understand installing multiple switchboards, etc. Address Box 288, care of THE AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 288

WANTED—Position with telephone company. I am an expert lineman and repair man; three years' experience; best of references furnished. Address P. O. Box 591, Toledo, Tama County, Iowa. 278

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—Position as superintendent of a large exchange or manager of a plant, 1,000 telephones or less. Have had ten years' experience in all branches of the business. At present am superintendent of an exchange in a city of 175,000 population. Open January 1st to any company that wants a hustler. Address Box 286, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 286

WANTED—Position as manager with a first-class company looking for a hustler. Experienced particularly in toll and long distance work, including clearing house methods, and line construction. Familiar with every detail of telephone work. Executive ability; excellent references. Address Box 285, care THE AMERICAN TELEPHONE JOURNAL, New York. 285

POSITION wanted by expert telephonist. Twelve years' experience from bottom up. Address Box 295, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 295

WANTED—Telephone salesman who has had experience in handling intercommunicating and private branch exchange apparatus. Address Box 296, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 296

(Continued on page 36.)

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(AMERICAN TELEPHONE JOURNAL, Dec. 10th.)

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the operation is the same: to call central, push one button; to call subscriber, push the other. You are invited to write for particulars and descriptive matter.

A NEW HOOK SWITCH.

AMONG the many original features brought out in the new telephone apparatus of The Dean Electric Company, Elyria, Ohio, is a removable lever type hook switch.

In the regular construction the hook lever projects from the side of the telephone, taking up extra space in shipping and in the store room, also requiring the instrument to be handled with extreme care to prevent the lever and its connected mechanism from being damaged. The new Dean hook switch is provided with a removable lever which need only be inserted in position after the telephone is mounted on the wall. When the lever is once in place it is securely locked by a spring catch, and can then only be removed by opening the lid of the telephone box as the release is located on the body of the switch.

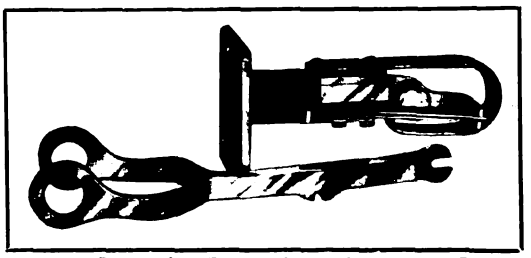

Fig. 1. Illustrating Removable Hook Lever of Dean Electric Co.'s New Type Hook Switch.

The removing and replacing of the lever does not require tools, neither does it disturb the switch mechanism, which is actuated by a stub lever. The latter serves as a lock to hold the hook lever in place and partakes of its motions when the hook is operated.

The Dean hook switch is self-contained in every sense of the word and is complete in itself, even to the escutcheon, so that no dependence need be placed on the telephone cabinet for operation or for holding the parts in their relative positions. It is fastened to the telephone by four screws passing through the escutcheon frame, an opening 15/16-inch in diameter being provided for inserting the body of the switch.

The contact springs are mounted on a small metal block which forms a unit. The various combinations of springs necessary to adapt the hook switch to different circuits being like mounted and interchangeable with the remainder of the mechanism. The accompanying illustrations show a two-contact spring combination for use on a central battery telephone. The contact springs are made from the best grade of spring German silver, tipped with pure platinum points and thoroughly insulated with hard rubber.

The hook switch frame and lever are thoroughly insulated from the parts entering the circuit, so that it is impossible to obtain annoying or dangerous shocks by personal contact with the exposed metal.

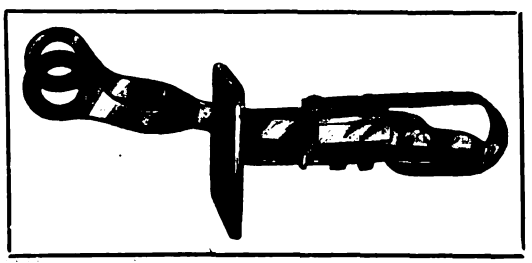

Fig. 2. The Dean Electric Co.'s Hook Switch Assembled.

The actuating or main spring is special German silver made heavy and long and with its tension applied near the fulcrum of the lever, thereby giving a light and positive action to the hook.

The entire hook is made up without castings or other breakable parts, and is finished in heavy nickel plate. all parts subjected to corrosion being copper plated under the nickel.

PERCY R. STEEL, 17 North Sixth street, Philadelphia, reports a large volume of business for his new type of distributing or bridle ring. This ring was described at length in a recent issue. Orders have been received from some of the largest companies in the country, and an extraordinary number of inquiries have come to hand relative to this important adjunct to the line construction of a system. This type of ring is made up in different finishes, as follows: Glass enamel, which offers an exceptionally high resistance; galvanized, and japanned. Besides this article, the manufacturer has a number of different hardware specialties for sale which are in daily use, such as iron pins, pole steps, lag screws, pipe clamps, etc. Information and prices of these articles will be gladly mailed upon request.

W. S. SEAMAN AND COMPANY, 216 E. Water street, Milwaukee, Wis., has had an unprecedented sale for its booths. Evidently the Independent operators throughout the country appreciate the dividend-earning capacity of booths, especially when they are built upon the most modern lines to secure secrecy and to exclude sound. For public pay stations a booth is as much a necessity as good transmitters and receivers, because people often wish to carry on a conversation that is private, and consequently when a booth is installed, as in a railroad station or general store, it will draw returns which will make it pay for itself in a short while. This company is a pioneer in the manufacture of booths and is able to turn out an article second to none. All communications will be cheerfully answered, and prices and other information furnished on application.

THE MORRIS ELECTRIC CO., Wilmington, Del., which manufactures hard fiber specialties for the electrical trade, is working over time to supply the demand for the fiber cleats. This little novelty is evidently filling a long-felt want, as orders are being received from every part of the country and range in size from lots of one thousand to half a million. When the quality of the article is considered, and one might say its almost universal need, it is not hard to understand this demand. It is as much ahead of the old-time wooden or porcelain cleat as a solid back is in advance of the early type of magneto transmitter. Being practically indestructible. it can be used indefinitely, and will always give the same solid grip which insures the neat appearance ot inside wiring which characterizes its use. Although the company is receiving orders every mail which keeps its factory working to its utmost capacity, it will be only too pleased to furnish samples and prices to all parties interested.

THE S. H. COUCH CO., 162 Pearl street, Boston, Mass., is meeting with remarkable success with its No. 10 private line and central station telephone. This instrument offers one of the most compact and practical arrangements of interior telephone apparatus put on the market. To exchange operators and managers the instrument should prove a large source of revenue, as there are many places where an intercommunicating telephone system can be used to advantage, as in stores, mills and private houses. On the farm, between outbuildings and the house it is very convenient, saving many steps which would otherwise be necessary, and since time saved is money earned, the use of this instrument should be a dividend

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The Open-Wireless Telephone Plant

is an all-cable plant; that is, it has no open wire (bare wire) or cross arms, and when supported on steel poles

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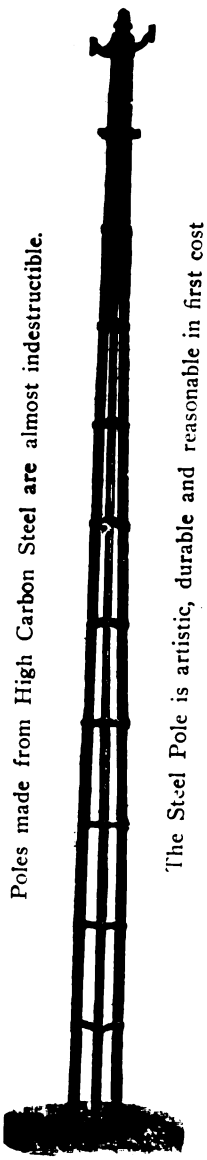

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Poles made from High Carbon Steel are almost indestructible.

The Steel Pole is artistic, durable and reasonable in first cost.

No poles to rot.
No cross arms to rot.
No glass insulators to break.
No crossed wires to interfere with service.
Trees do not interfere.
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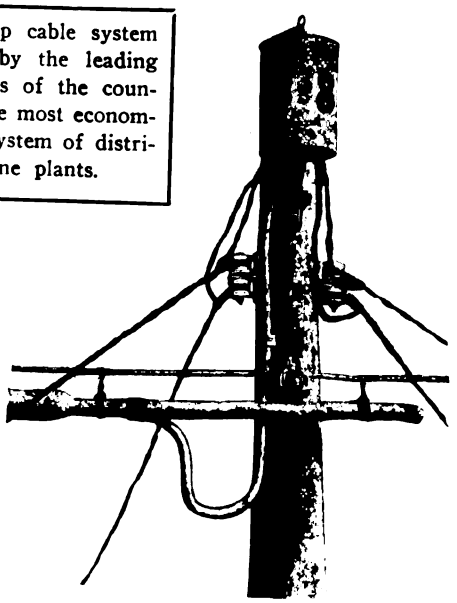
No unsightly cross arms and wires on the streets.
No bare wires to break and fall on electric light wire and kill someone passing by.

The multiple tap cable system is acknowledged by the leading telephone engineers of the country to be by far the most economical and durable system of distribution for telephone plants.



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Equipping for Party Lines
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Plans, Specifications and Supervision of Installation of Complete Telephone Plants

WILL GUARANTEE TO INCREASE THE DIVIDENDS IN 99 TELEPHONE PLANTS OUT OF EVERY 100

Engineering, constructing and putting plants on a dividend-paying basis a specialty.

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There are many leak holes in a telephone plant unless properly watched.

With proper co-operation on part of owners of telephone plants I will guarantee to make any Telephone Plant pay dividends or increase your present earnings. Can refer you to a number of telephone plants where I have saved thousands of dollars in first cost of the plant, increased the earnings, improved the service, decreased the operating expenses by installing proper apparatus in the proper way and properly organizing the working force. Can furnish expert engineer, wire chief, auditor, solicitor, chief operator, each a specialist in his line.

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maker. Write for bulletins and prices and get acquainted with it.

THE TELEPHONE PRINTING CO., of Defiance, Ohio, has developed the accounting and recording systems for telephone companies to the highest point of efficiency. Since the financial returns are what keeps a company in operation, it is evident that the best methods of business are necessary. This company meets these demands with its line of blanks, forms and books for every conceivable use, among which may be noted the following: toll tickets, trouble tickets, exchange directories, toll station journals and ledgers, toll receipts, lease and rental records, etc. A card index system specially designed enables the simplest record of a line to be kept and makes possible a system which is always up to date and full of just the information one wants. Samples and forms will be mailed upon application.

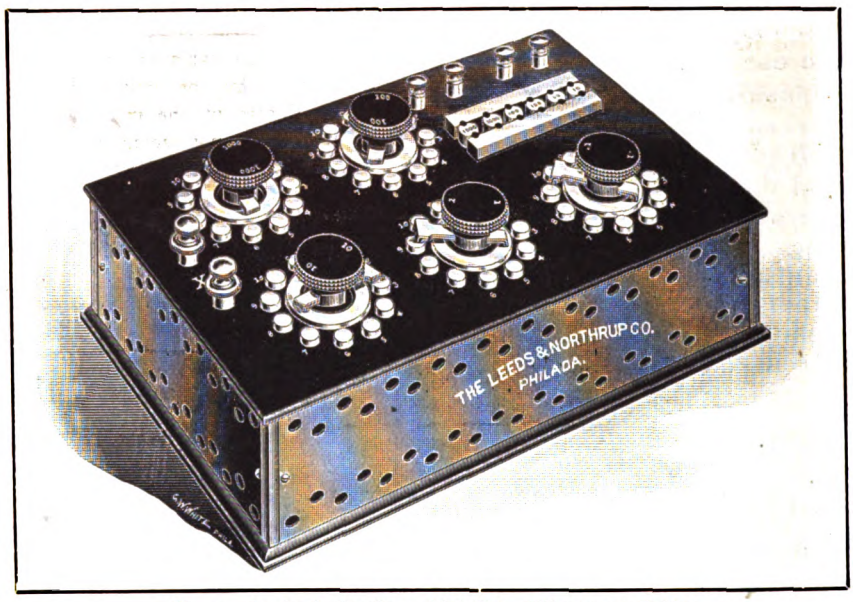

Fig. 1.—Leeds & Northrup Dial Type Wheatstone Bridge.

LEEDS AND NORTHRUP WIN GRAND PRIZE.

AS any industry develops it necessitates a corresponding evolution of all kindred branches of manufacture to which it may be more or less directly related; and so the evolution of the telephone has caused a corresponding development in the perfection and manufacture of electric instruments.

In this development the LEEDS & NORTHRUP COMPANY, of Philadelphia, have now one of the most advanced places among American manufacturers of electrical apparatus. At the Louisiana Purchase Exposition this company presented one of the most extensive exhibits of the highest grades of electrical testing apparatus, for which they have been awarded the Grand Prize, which is the highest encomium within the power of the Exhibition Company to bestow. To describe the exhibit, the Leeds & Northrup Company have issued an exceedingly attractive and comprehensive catalogue, which illustrates all of the various instruments of their manufacture, and accompanied by a description in two-color work, whereby the salient features of each instrument are placed before the reader in such a manner as to bring the noteworthy points of excellence particularly into relief.

The first few pages are devoted to a description of the various forms of Wheatstone bridges, rheostats and other apparatus for the measurement of resistances, the special features being the designing of the resistance coils upon an improved metallic spool, the superior arrangement of the ratio coils, and the design of the plug having no sharp corners, with heads so arranged that the insulating portion cannot be removed; the method of constructing the plugs and their sockets so that good contact may be always secured. Then comes a description of the various forms of potentiometers, including many designs of the slide wire bridges and other forms of apparatus for measuring low resistances. The so-called dial pattern occupies a prominent place. It is illustrated in Fig. 1. While this form of the Wheatstone bridge is somewhat more expensive to construct than the ordinary type, it is well worth the additional cost, because it can be manipulated so much more readily than the plug type, and from the fact that there are no loose parts that can under any circumstances be loosened, and furthermore there is little possibility of making an error in reading the coils of the rheostat, which are included when a measurement is made.

Fig. 2.—Leeds & Northrup Portable D'Arsonval Galvanometer.

Two unique and particularly desirable forms of the D'Arsonval galvanometer are shown in the catalogue, one a hollow tube which may be readily clamped upon any supporting partition, and that carries a scale and telescope having universal adjustment, to permit of easy manipulation; another, which is illustrated in Fig. 2, is mounted in a box, with a rubber top and two binding posts. The coil is circular in form, turns over an iron core, and is mounted upon jewels. It is very sensitive for a galvanometer of this type, is thoroughly well made and the pivoted system has exceedingly small friction. The current due to one volt through 1 megohm will cause

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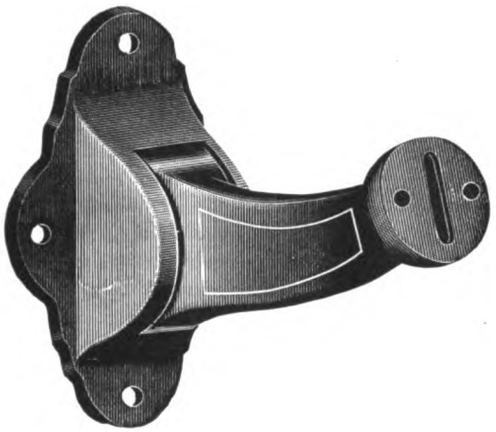
THE NEW

Baird Telephone Arm



Invisible Joint. Constant Friction. Nothing to get out of order. Nothing to adjust. No handling required after it has been enameled and striped. This insures a perfect finish. A 1905 telephone set without it would be a back number. When buying new equipment insist upon this arm. Made in different length arms and different style bases. Costs no more than present type of arm. Illustrated circular and prices upon application.

Baird Manufacturing Company,
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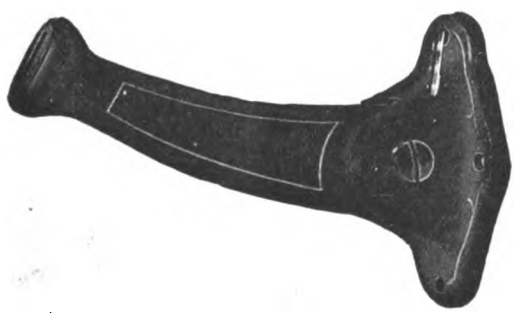
WE HELP TO MAKE

A Good Telephone



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"Style A."
(Exact Size.)

For Twin or Parallel Wires
Price $4.30 per 1000.

by many of the largest Independent and Bell Telephone Companies. : : :

The Morris Hard Fibre Cleats

Style "B."
(Exact Size.)

For Twisted Pairs.
Price $4.50 per 1000.

must have merit. They have. Some companies buy them because they are **smaller** and **neater** than wooden or porcelain cleats. The chief reasons however are **ease of installation**—(requiring only **one screw** per cleat for twisted pair), absolute security against breaking (which saves maintenance cost), and superior insulating qualities. **They're cheaper, too.**

Order a few, try them and we know you'll like them. Or let us send you some **SAMPLES FREE.**

Style "C."
(Exact Size.)

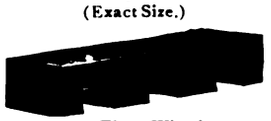
For Corners.
Price $4.00 per 1000.

Specify Color: Red, Gray or Black

MORRIS ELECTRIC CO.

Manufacturers of Fibre for . . Electrical Purposes . .

"Style D."
(Exact Size.)



For Three Wires
Price $6.50 per 1000.

Fourth and Shipley Sts., Wilmington, Del.

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the pointer to move about 1 mm. over the scale. The pointer can be adjusted to zero from the outside of the case and the coil is so well balanced that the galvanometer can be used in an inclined position. This instrument will be found very useful in all places where a sensitive, portable detector galvanometer is required. The scale over which the pointer moves is calibrated for 10 divisions each side of the zero, so that up to this limit the galvanometer will serve as a measuring instrument when its constant has once been determined.

Various forms of self-induction apparatus and condensers are illustrated, and finally the catalogue closes with an extended account of the Rosa curve tracer, an instrument that is of inestimable importance to those dealing with alternating current appa-

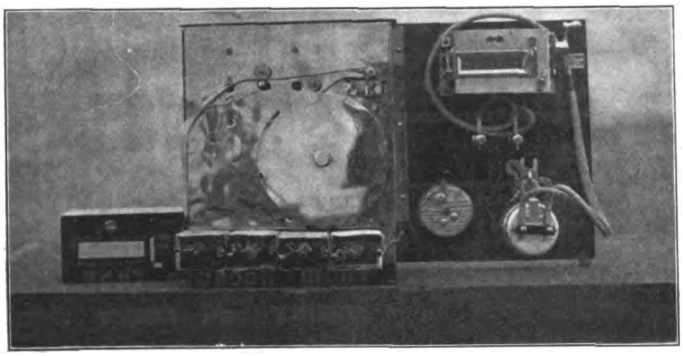

Fig. 1. Register and Recorder of Demonstration Set Used by the Measured Service Co.

ratus. Illustrations are given showing the working of the various methods of electrical measurements to which the Rosa curve tracer is especially applicable.

There is not a telephone company of any importance in this country to which the Leeds & Northrup Company's apparatus is not of interest. Quick and accurate service on a small margin of profit is the keynote of the Independent telephone business. Good measuring, testing and fault-locating instruments go a long way towards the accomplishment of quick and accurate service. Every telephone company therefore should have a copy of this new Leeds & Northrup catalogue, which will be gladly sent to anyone interested.

NEW MEASURED SERVICE METER.

A SHORT time ago in our columns we described a measured service meter, which has recently been placed on the market by the Measured Service Company; and now this corporation has produced a modification of their coin box, particularly adapted to use in combination with a desk set. The desk set meter consists of a handsome nickel-plated base, which forms the foundation, which is about one-quarter of an inch larger than the standard wall meter. Either side of the base is supplied with a screw hole, so that the meter may be quickly and easily attached to any part of the desk or other piece of furniture without marring it in any way. The special base is so constructed that three wires from the meter lead out through a single insulated outlet at the top. This makes the wire connection very simple and very neat, and presents an even more attractive appearance than the wall meter. This design has been termed model B, the mechanism being identical with the wall device, which is termed model A. With a view toward placing its apparatus before all telephone managers and operators throughout the country, this company devised a sample set which could be used to demonstrate the simplicity of its meter system. These sets were placed in the hands of efficient men, who have been visiting various exchanges, describing to the managers many salient points of measured service.

The apparatus is illustrated in Figs. 1 and 2. Fig. 1 shows the meter mounted on the upper right hand corner and the statement-taking device on the left. The batteries, receiver and switch complete the device. The object of the receiver is to enable the signal to be heard, which is sent in when a call is recorded. The switch controls the circuit to the recording instrument, which consists of a drum holding a roll of paper tape. This tape is drawn by means of clockwork through a printing machine which has a wheel controlled by a magnet, so arranged that when the circuit is closed the printing wheel is drawn into contact with the paper and, according to the length of time, so the wheel prints either dashes or dots. These dashes and dots represent numbers or combinations of numbers.

When a statement is being taken, the lever to the right of the meter is pulled down. This causes a contact point to travel along a grooved rod, shown in Fig. 2.

When the lever is released, it moves back by clockwork and causes the contact point to travel back; as it does so it makes and breaks contacts upon the registering wheels and thus sends in impulses of various durations, which actuate the clockwork and printing mechanism of the statement-taking machine. Fig. 2 illustrates the mechanism of the register and recorder.

BAIRD MANUFACTURING CO., 4 Michigan street, Chicago, Ill., has just contracted with several of the large telephone manufacturing companies for their entire output of telephone arms. The Baird invisible joint, constant friction arm has taken the eye of telephone men wherever it has been shown, and those manufacturers who have not seen the arm would do well to get in communication with the company about them. It is the only arm on the market which is completely enameled and striped after it is assembled. The friction in the arm is permanent as soon as the arm is assembled. One of these arms was recently attached to a machine in their factory and given approximately one million motions to ascertain how lasting was the friction. There was apparently no change in the friction after this experiment. It is in the market to supply these arms in any quantity at very short notice. Special prices are made where it supplies a company's entire output of transmitter arms. Prices and more detailed information will be gladly furnished.

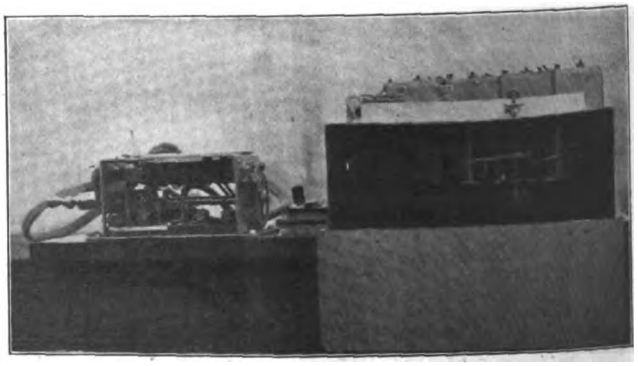

Fig. 2. The Mechanical Arrangement of Measured Service Co.'s Demonstration Set.

FRANK B. COOK, 240 West Lake street, Chicago, Ill., is conducting experiments at Lewis Institute on new protective devices, which, he says, will practically revolutionize the present system, as they are along entirely new and different lines.

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WANTED

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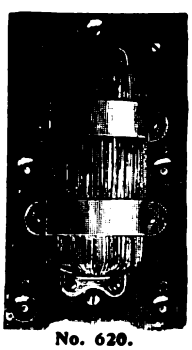

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With this wonderful little Transformer coil you can make 3 metallic circuits out of 2. It increases your toll line capacity 50%, without the necessity of building new lines.

We can furnish you with Party Lines, Exchanges, Switchboards, a variety of Telephones and Telephone Supplies or miscellaneous parts.

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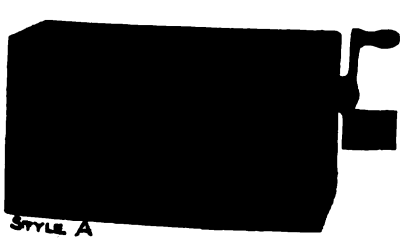
Our line of Meters covers every requirement of Private and Toll Service and we earnestly hope to have the opportunity of proving these assertions to you while you are in Chicago.

We thank you in advance for calling on us.



Measured Service Company

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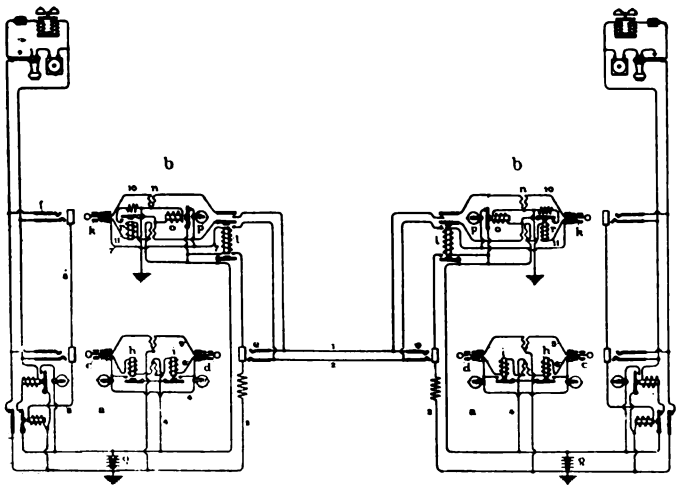
TELEPHONE PATENTS

TRUNK LINE CIRCUIT.

F. R. McBerty, of Evanston, Ill., patents (No. 772,898) an improved trunk line circuit and assigns to the Western Electric Company. This invention relates to trunk line circuits so arranged as to be used for either incoming or outgoing work from either exchange. The circuit arrangement is shown in the accompanying illustration and the operation is as follows: Line spring jacks *e* are multipled in the subscribers' sections, the test thimbles forming branches of conductor *3* which is designed to form a part of a local circuit *3 4* with the flexible conductor terminating in a corresponding contact of the plug *d*. The plug circuit *5 6* of the plugs *c* and *d* is connected to the central battery *g* in the usual manner. Besides the trunk line jacks branches are taken to the terminal plug *k* of the trunk line at the incoming section. These branches are controlled by an electromagnetic switch *l*, the actuating magnet being connected in conductor *7* terminating in the local contact of the plug *k*, and is thus brought into the local circuits *7 8* with a corresponding wire *8* of a sub-



scriber's line when the trunk line is united therewith. The extensions *1* and *2* of the trunk line after traversing the separable contacts of relay *1* are united through the windings of a repeating coil *n* and the magnet relay *o*. This is of sufficiently high resistance to prevent the actuation of supervisory relays *h* or *i* by the current when plug circuit *5 6* is connected with the distant terminal of the trunk line. This relay controls the circuit through a clearing out signal *p* connected in the conductor *7* in parallel with magnet switch *1*. The other windings of the repeating coil *n* are in circuit *10 11* which is a continuation of trunk line *1 2*, including the source of current *g* and the magnet of relay *r* whose contacts control the shunt of relay *o*. When the trunk line is not in use, only the terminal spring jacks are connected with it. In using the trunk line, the order is given by the subscriber's operator in the usual way, and at the same time the calling subscriber is linked to the plug line and by the plugs *c* and *d* inserted in the jack of the calling subscriber and the outgoing jack *e* of the trunk line.

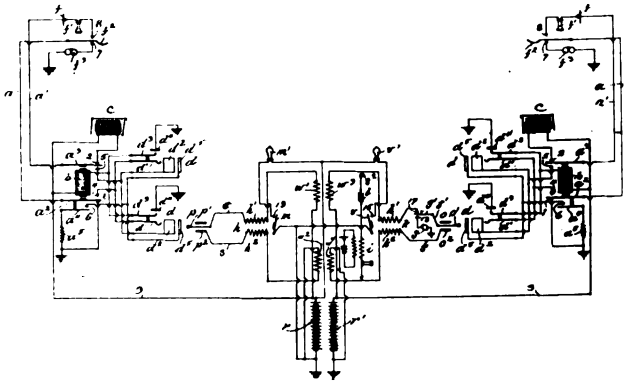
SWITCHING MECHANISM FOR INTERCOMMUNICATING TELEPHONES.

A. K. Andriano and H. Herbstritt, of San Francisco, Cal., patent (No. 771,114) an improved switchboard mechanism for intercommunicating telephones and assigned by mesne assignment to the Direct Line General Telephone Company, of San Francisco. This is a patent upon improved mechanism for switching particularly adapted to intercommunicating systems. The object is to enable one station to call and come at any other station without requiring the services of the central station operator. Each substation set is provided with a movable switch and contact points corresponding to each line. The switching mechanism operates electromagnetically and is located at some central point which corresponds to a switchboard and in this respect the invention belongs to the automatic class.

The invention is too complicated to be described in our brief abstract, and those interested are recommended to secure a copy of the patent.

IMPROVED COMMON BATTERY SWITCHBOARD CIRCUIT.

Kempster B. Miller, of Chicago, Ill., patents (774,770) an improved common battery switchboard circuit and assigns to the Kellogg Switchboard and Supply Co. The object of this patent is to provide an improved common battery switchboard circuit. It contains most of the features which are so familiar in the



Kellogg circuits. The circuit is diagrammatically shown in the accompanying illustration, the operation of which is as follows:

Assume the right hand and left hand subscribers to be represented by capitals *A* and *B*. If *A* removes his receiver he closes the circuit through the line lamp *a* and *a'*, completing circuit from battery *r* through conductor *3*, through line signal *c*, contacts *2* and a^2, conductor *a'*, conductor *a*, contacts a^2 and *1* to battery. The line signal *c* is actuated and the operator inserts the answering plug *p* into the answering jack *d*. The tip of the plug moves spring *d'*, carrying spring d^2 to contact d^4. Circuit of relay *b* is then closed from ground through battery *r*, conductor *3*, relay *b*, spring d^2, contact d^4 to gound. The armatures a^2 and a^3 are attracted, contacts one and two opened, deenergizing the line signal *c*, and the springs a^2 and a^3 engage contacts *4* and *5*, connecting the spring jack with the line. The plug also completes circuit from battery *r* through windings *w'* and w^2 of the repeating coil to the windings *h'* and h^2 of the supervisory relay *h*, through conductors *t* and *s* and the line conductors *a* and *a'*. As the windings *h'* and h^2 are differential the relay *h* is not excited and the lamp *m'* is not illumined, The operator tests and rings in the usual manner, as is easily traced over the circuit shown. When subscriber *A*, for example, restores his receiver the circuit of battery *r* is closed through windings *w'* and *h'*, strand *t*, tip of plug *p*, line spring *d*, contacts *4* a^2, conductor *a* to ground, while the other side of the line is open. The current traverses winding *h'*, while h^2 is de-energized; the supervisory relay then attracts armature *m* closing circuit through the supervisory lamp *m'*, notifying operator that subscriber has returned receiver.

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THE WEEK'S MESSAGES

FINANCIAL.

WASHINGTON, D. C.—The National Telephone & Electric Company has been admitted to the State of Illinois with a capital of $100,000 to be employed in that State.

WEST STOCKBRIDGE, MASS.—The Mutual Telephone Company has voted to declare a dividend of 7 per cent. on its past six months' earnings.

BATTLE CREEK, MICH.—The Citizens' Telephone Co. has declared a semi-annual dividend of 4 per cent. The following officers were elected: E. B. Fisher, president, Grand Rapids; L. McCoy, vice-president, Battle Creek; C. F. Tart, secretary and general manager, Grand Rapids; L. W. Robinson, treasurer, Battle Creek.

COLUMBUS, OHIO.—The Citizens' Telephone Co. has decided to issue $200,000 of preferred stock. This amount was left unused of the original capital of $500,000. The money will be used in defraying the cost of construction of a new building and the proposed automatic switchboard.

INDEPENDENCE, OREGON.—The Independence Mutual Telephone Co. has increased its capital stock from $500 to $1,000.

McKINNEY, TEXAS.—The McKinney Telephone Company has increased its capital stock from $20,000 to $30,000.

FRANCHIISES.

DENVER, COL.—The El Paso Telephone Co., of Colorado City, will apply for a franchise in this city, and also El Paso, Teller, Fremont and Pueblo County.

ALTA, IA.—The Alta Telephone Company, of this city, has been granted a franchise for twenty years. The company is composed of David E. Hadden and G. Frank Tincknell, and is entirely owned by local capital.

SPRINGFIELD, MASS.—The Commercial Telephone Co. has applied to several towns in the State for permission to erect its poles preparatory to establishing service.

WESTBROOK, MINN.—The Southwestern Minnesota Telephone Co. seeks a franchise through here.

PROVIDENCE, R. I.—The Town Council of Narragansett has granted a franchise to the Providence Telephone Company.

ELECTIONS.

MOUNT MICA, ME.—The Mount Mica Telephone Company has elected the following officers: President, C. S. Childs; treasurer, Scott Briggs; clerk, Wm. Colby.

ROCKPORT, MISSOURI.—The Mutual Telephone Company has elected the following board of managers: Dr. A. McMichael, Dr. W. R. Strickland, Dr. J. H. Hedgpeth, H. F. Stapel and W. B. Christian.

CHATHAM, N. Y.—At the annual meeting of the Chatham Co-Operative Telephone Co. the following officers were elected: President, R. W. Seymour; vice-president, E. B. Gifford; secretary, F. B. Pratt; financial secretary, J. H. Page; treasurer, H. A. Branion; superintendent, P. G. Babcock.

KINDRED, N. D.—P. M. Andersgard has been elected president of the Neighbor State Telephone Company, and Sam Gilbertson, secretary.

PORTSMOUTH, O.—The Portsmouth Telephone Company has elected the following officers: H. S. Grimes, president; J. S. McKell, vice-president; E. E. Knox, secretary and general manager.

SUSQUEHANNA, PA.—The Susquehanna Telephone and Telegraph Co. at the annual meeting elected the following-named board of directors: C. E. Titsworth, M. H. Cisman, Frank Zeller, E. W. Jackson and M. J. Lannon.

FREDERICKSBURG, VA.—The Orange Telephone Co. declared a dividend on its stock, and elected the following officers at a recent meeting: G. S. Shackleford, president; Col. C. C. Taliaferro, vice-president; J. Crittendan, general manager.

COMBINATIONS.

NEWBURG, IA.—The Grinnell & Newburg Rural Telephone lines have been purchased by J. L. Burrough, who will continue to run the line.

WATERVILLE, KAS.—J. J. Groesbeck has sold two miles of a local telephone line to the Irving Telephone Company.

LONDON, KY.—John Woodward, of Barkerville, has leased the London Telephone Exchange for two years.

NEW COMPANY NOTES.

HUNTSVILLE, ALA.—Inter-County Telephone Company is being organized by a number of farmers in Madison and Morgan Counties.

BEARDEN, ARK.—The Bearden Telephone Company, of this city, has been incorporated with a capital stock of $2,000, of which $1,000 has been subscribed. Wm. M. Gatling, president; Jeff Gatling, secretary; Wm. Gatling, Jr., treasurer.

SYCAMORE, ILL.—The Selected Signal & Telephone Mfg. Co. has been incorporated with a capital stock of $100,000 by J. C. K. Joslin and others.

LAKETON, IND.—The Disko and Laketon Telephone Co. has been incorporated with a capital stock of $15,000. Directors: F. J. Zimmerman, E. L. Harmon and H. C. John.

SOLON, IA.—The Solon Telephone Co. has been incorporated with a capital stock of $900. President, J. F. Potter; vice-president, M. T. Loder; secretary, J. J. Fiala; treasurer, Geo. Ulch.

HALLOWELL, ME.—The Woodland Telephone Company has been organized with Frank Collins as president.

MANCHESTER, ME.—The Woodland Telephone Company, of Manchester, Me., has been incorporated with a capital stock of $10,000 to supply telephone service to the towns of Manchester and West Gardiner. The officers are: F. S. Collins, president; H. E. Emery, secretary, of Gardiner; J. T. Collins, treasurer, of Manchester Me., and James T. Collins, of Hallowell, Me.

HENRIETTA, MICH.—The Henrietta Central Telephone Co. has been incorporated with a capital stock of $550. Directors are T. J. Spears, J. Turner and A. White.

LAMONTE, MO.—The Lamonte Telephone Co., capital $5,000, has been chartered here by W. E. Files, W. F. Yankee, H. C. Mitchell, Arthur Bender, J. F. Staples and others.

PLATTE CENTER, NEB.—The Farmers' Independent Telephone Company, of this city, has been incorporated with a capital stock of $2,000.

JAMAICA, L. I., N. Y.—The Long Island Telephone & Tel. Co. has been incorporated with a capital stock of $500,000. The directors are E. A. Sneadeker, F. N. Green, and others.

LEONARDSVILLE, N. Y.—The Leonardsville Telephone Company, of this city, has been incorporated with a capital stock of $1,000. The incorporators are E. S. Brand, J. A. Crandall, A. M. Coon, all of Leonardsville.

HENNESSEY, OKLA.—The Center Township Rural Telephone Company, of Hennessey, has been incorporated with a capital stock of $1,000 by Frank Hassler, of Dover; Ben Thorne, William Beaman and others, of Hennessey.

INDEPENDENCE, OREGON.—The Mutual Telephone Co. has been organized with a capital of $1,000. R. Craven, president; W. W. Percival, vice-president; G. A. Hurley, secretary.

CLIFTON, TENN.—The Consolidated Telephone Co. has been incorporated with a capital of $50,000 by H. B. Stubblefield, of Nashville; W. N. Sloan, of Linden; T. S. Hughes, of Clifton, and others. These parties own telephone lines in Wayne, Hardin, Perry, Decatur and McNairy counties.

CLARKSVILLE, TEXAS.—The Home Telephone Co., of Clarksville, has been incorporated with a capital stock of $2,500 by John B. King, N. F. Deak and Hiram Glass.

MADISON, WIS.—The Belmont & Pleasant View Telephone Company, of Madison, Wis., has been incorporated with a capital stock of $5,000.

PERSONAL

H. J. PATTISON has been appointed manager for the Michigan State Telephone Company of Wyandotte.

E. E. LARHAM has been appointed manager for the Inter-Ocean Telephone Company at Penn Yan, N. Y.

CLARENCE HATCH has been appointed manager for the telephone company at Algoma, Wis.

J. A. PAGE has been appointed manager at Potterville, Mich., for the Citizens' Telephone Company, of Grand Rapids.

J. A. McCURDY has been appointed manager for the Cumberland Telephone Company at Mayfield, Ky.

V. K. HERLAN has been appointed manager for the Woodsfield Telephone Company at Woodsfield, Ohio.

FRANK BROWN, who was one of the most prominent telephone men in the State of Iowa and was interested in exchanges at Ottawa, Wichita, Emporia, besides operating a large number of toll lines, died recently.

C. L. HOWK, of the Local Telephone Company, of Norwalk, Ohio, has resigned to accept the position as manager of the Citizens' Telephone Co., of Plattsburgh, N. Y.

MISCELLANEOUS.

LOGANSPORT, IND.—At a recent meeting of the Cass County Surety Company which controls the stock of the Home Telephone Company, of this city, President Walter J. Uhl presented some statistics that showed the volume of business transacted by the local exchange on an average day of twenty-four hours. He stated that on November 20, an account was kept of every call into the office and it was found that there were 66,464. The busiest time came between eight and nine o'clock, when there were 6,837 calls.

DUBUQUE, IA.—Manager Stevens, of the Dubuque, & Interstate Telephone Companies, announces the opening up of a direct line running from here to Freeport.

ASHLEY, MICH.—The Ashley Improvement Associaton has taken action looking toward the building of a telephone exchange at Ashley.

BAY CITY, MICH.—President James E. Davidson, of the Valley Telephone Co., denies emphatically that the Valley Company has under consideration any proposition to unite or amalgamate with any other telephone company or system, or that such action was contemplated in the future. President Davidson attributes the rumors in this connection to the fact that the company is contemplating extensions of the Valley system.

HOUGHTON, MICH.—A telephone line is proposed to be run from Ontonagon to Matchwood, Bergland, Ewen and Bruce Crossings.

OVID, MICH.—The Union Telephone Co. has removed the exchange at Shepardsville, taking out the State lines, all calls on that line will go through the Ovid exchange.

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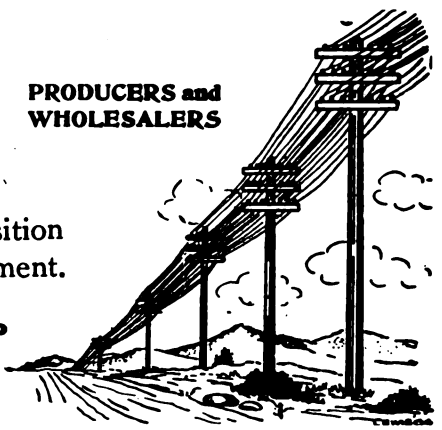

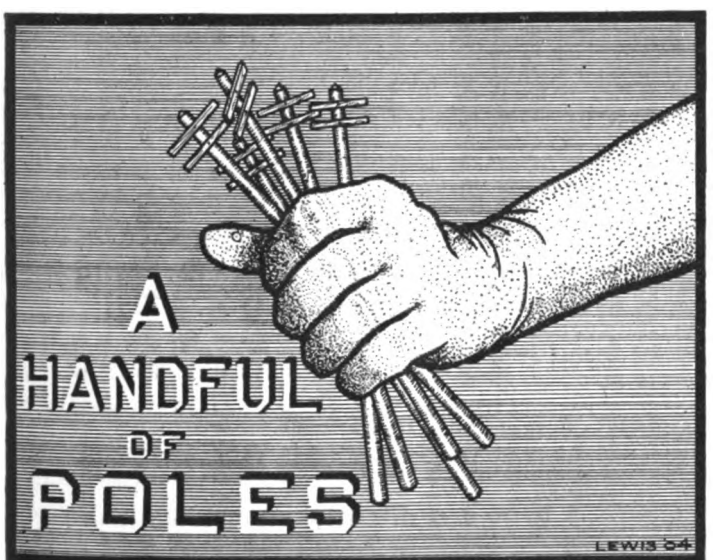

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ENTERPRISE, MO.—A meeting of those interested in the proposed City Mutual Telephone System was held at the city hall recently, and a committee was appointed to have a plant figured on.

BEATRICE, NEB.—A number of farmers living west of Pickerell have organized a farmers' exchange.

PENNINGTON, N. J.—The Pennington Telephone Co. has filed a certificate changing its office from Jersey City to this town.

CINCINNATI, OHIO.—The third attempt on the part of the Queen City Telephone Company to secure entrance to Cincinnati was begun recently in the Circuit Court. The original case was decided for the Queen City Telephone Company by the late Judge Nippert. This decision was reversed by Judge Littleford and the case was taken to the Circuit Court on appeal.

ECONOMY, PA.—F. N. Moser, a representative of the Economy Telephone Co. was in Berlin this week having a stock subscription for the purpose of establishing a local exchange there. Work on other extensions is being speedily pushed forward.

PITTSTON, PA.—The People's Telephone Company, of Pittston, was damaged, it is reported, during a recent storm to the extent of $50,000.

LEWISBURG, TENN.—The telephone line from Lewisburg to Yell has been completed. Every district in Marshall County, eighteen, is now connected by telephone with the county capital.

PARIS, TENN.—The Legislative Council of Paris has granted to local capitalists a franchise to establish and conduct a telephone system in Paris for fifty years.

CHASE CITY, VA.—A telephone line is being considered between this place and Red Oak.

NEWBURG CENTER, VT.—The Newburg Center Telephone Company has built 90 miles of lines this past year and expects to eclipse this next year. This company claims to have the largest free exchange in the State.

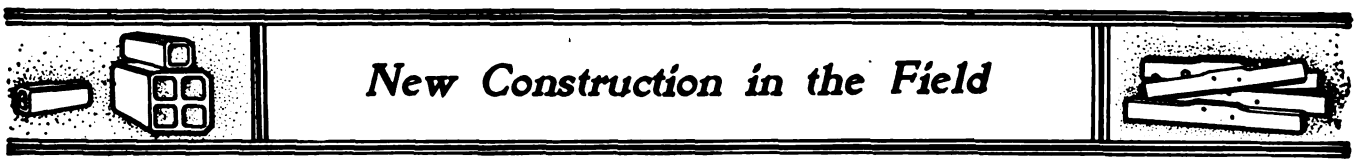
BENTON, WIS.—A plan is on foot among the progressive citizens of this town to put in a local telephone exchange.

UNDERGROUND.

SPRINGFIELD, ILL.—The Inter-State Telephone Company has a force of men at work laying an underground 200-wire cable from the office on Monroe street, east on Capitol avenue to Eleventh street, thence south to South Grand avenue. The new connection will accommodate the increased business south of the avenue.

PARIS, TENN.—The Paris Telephone Co., capital $25,000, will put in a new telephone system, placing the wires underground.

GREEN BAY, WIS.—The Valley Telephone & Tel. Co. is constructing an underground system in this city.



BLUE RIDGE, GA.—W. G. Ownby, of this city, will install a telephone system at Lafollette.

DANVILLE, ILL.—The Vermilion County Telephone Co. is installing a new switchboard with a capacity for 2,800 lines.

EDWARDSVILLE, ILL.—The Kinloch Telephone Co. is changing the location of its exchange and overhauling its system.

ROCK ISLAND, ILL.—The Chicago, Rock Island & Pacific R.R. is building a telephone line between Denver, Colorado Springs and Goodland, Kan.

LA PORTE, IND.—The La Porte Telephone Co. is building a permanent line to East La Porte. Forty-foot poles are being erected and the company will soon be ready to give the best of service to the citizens of East La Porte.

DES MOINES, IA.—The Mutual Telephone Company is putting its wires underground, and has entered upon the work of substituting cable leads for open wire, overhead construction, using 45 miles of lead coated cable.

ELDON, IA.—The Eldon Telephone Company contemplates a number of improvements to its system, including considerable cable work.

STUART, IA.—The Mutual Telephone Company is considering a new exchange.

WESTBROOK, ME.—The Northeastern Telephone Company is making rapid progress on the installation of its conduits and expects to install a switchboard at once.

CITY OF MEXICO, MEX.—A private telephone system to connect the National Palace, Chapultepec castle and the private residences of President Diaz is to be installed under the direction of Oliver Lopez Araiza, an electrician.

HART, MICH.—The Lake Shore Telephone Company, with headquarters at this town, has installed an automatic system at Pentwater.

HOPKINS STATION, MICH.—The construction gang of the Citizens' Telephone Company is at work in this township, repairing and improving the property recently purchased from the West Michigan Telephone Company. Since the Grand Rapids company assumed control the Citizens' exchange has grown to such an extent that the company decided to put Hopkins exchange on the direct copper circuit, which it is now installing between Allegan and Grand Rapids.

LAINGSBURG, MICH.—A rural telephone line is being built from the village to De Witt.

MULLIKEN, MICH.—The Citizens' Telephone Co., of Grand Rapids, is rushing its link line between Lake Odessa and Grand Ledge. Poles are up and wire will be strung to Mulliken next week.

DASSEL, MINN.—The Dassel & Collinwood Telephone Company is now working on an extension of its line into Ellsworth.

DEXTER, MINN.—The Farmers Telephone Company is putting in a new line between Dexter and Brownsdale.

FAIRBAULT, MINN.—Work has commenced on the construction of a rural telephone line from Fairbault to Shieldsville.

INTERNATIONAL FALLS, MINN.—The Rainy River International Telephone Co. intends to install a telephone system in this village.

LESUEUR, MINN.—The Farmers' & Merchants' Mutual Telephone Company has just completed and opened a service line from this city to Belle Plaine.

SACRED HEART, MINN.—Carl Anderson contemplates installing a local telephone exchange.

ANACONDA, MONT.—The Big Hole Telephone Company will connect with the Anaconda exchange in the near future.

CARLSBAD, NEW MEXICO.—The Public Utilities Company, an organization of Carlsbad capitalists, will construct a telephone line between this city and Artesia.

MOULTONBORO, N. D.—The Citizens' Telephone Company contemplates extending its line in the spring.

NEW BOSTON, N. H.—The work of setting poles for the new Francestown Telephone Company, in charge of Walter C. Johonnet, is progressing.

BARTON, N. Y.—The Ross Hill-Barton Independent Telephone Company is building its lines and will install the telephones as soon as possible.

BERKSHIRE, N. Y.—The Northern Tioga Telephone Company is extending from this village to Rawson Hollow, and will build a line from Hartford Mills.

FULTON, N. Y.—The Fulton Telephone Company is making arrangements for extensive improvements to its line. The company has about 300 telephones, and there are 75 new orders, but it is unable to accommodate this number at present. By the improvements which the company intends to make, it can easily handle 800 telephones.

MIDDLE ISLAND, N. Y.—The Suffolk Telephone Company has started the construction of a line to this village.

RICHFIELD SPRINGS, N. Y.—The Interstate Telephone Company has begun work on its line to Middleville by way of Eatonville and Elm Grove. At Middleville connections will be made with the wires of the Herkimer County Telephone Company.

SCHENECTADY, N. Y.—The Schenectady Railway is about to install a telephone system on its line.

LITCHVILLE, N. DAK.—The Litchville Rural Telephone Company will extend its Farmers' line in the near future.

MINOT, N. D.—The Northern Telephone Company has extended its lines to Rolla.

BELLAIRE, OHIO.—The National Telephone Company is at work on its new building on Guernsey street.

BROKENSWOOD, OHIO.—The Bucyrus Telephone Company has extended its lines to this village and will establish an exchange. A line is being built to Sheffield.

PIQUA, OHIO.—At a recent meeting of the directors of the Piqua Home Telephone Company it was decided to begin work at once on the erection of about 10,000 feet of additional telephone cable.

YELLOW SPRINGS, OHIO.—The Citizens' Telephone Company is constructing a farmers' line northwest of Yellow Springs, and about twelve new subscribers will be added to the local exchange, making abtu 148 subscribers in all.

ALTOONA, PA.—The United Telephone Company contemplates extensive improvements to its rural lines in the near future.

WESTCHESTER, PA.—The United Telephone Company is erecting a new pole line which will carry a number of new circuits, necessitated by its increased business.

FAULKTON, S. D.—Mr. J. H. Hays, manager of the Central Telephone Company, contemplates making extensive improvements in the system.

MADISON, S. D.—The Orland Telephone Company will construct a telephone line from Orland to this city. P. M. Benmer is president.

SALEM, S. D.—The Independent Telephone Company, of Sioux Falls, is building its line into Salem.

LA FOLLETTE, TENN.—W. G. Ownby, of Blue Ridge, Ga., contemplates putting in a telephone system at this place.

ALVIN, TEXAS.—The Alvin and Angleton Telephone Company will extend its line to Friendswood, in Galveston county.

BEDFORD, VA.—The Bedford & Campbell County Telephone Company is constructing a line from Coffee to Forest. This line will be utilized very generally by the farmers in the community traversed.

MIDDLEBURG, VT.—The Addison County Telephone Company is extending its lines to this village.

NORTHFIELD, VT.—The Northfield Telephone Co. is making extensive repairs to its system.

CHEHALIS, WASH.—The Home Telephone Co. will connect its system with a line that will be built by the residents of Alpha, a town about 20 miles away. The Home Company is also constructing several other rural lines.

WILBUR, WASH.—T. B. Seaton, owner of the Seaton Ferry, is interested in the construction of a telephone line from his ferry to Wilbut.

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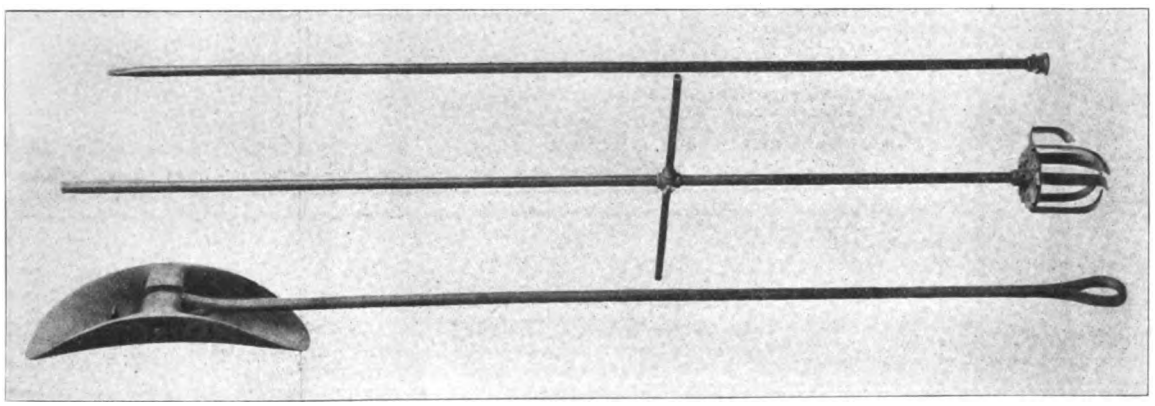

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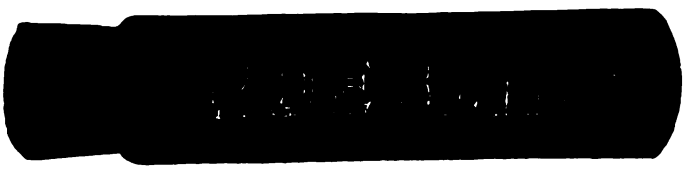

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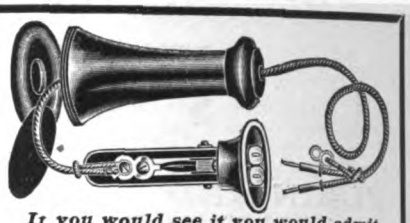

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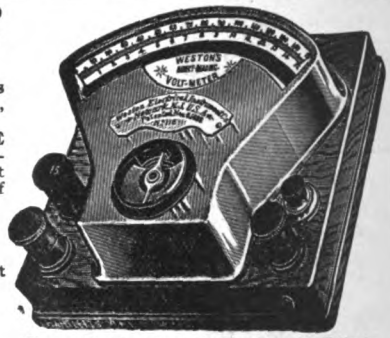

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"Where is the Fool Killer?"

"It is with great pleasure that we noticed another evidence of your energy in last week's issue of THE AMERICAN TELEPHONE JOURNAL under the title, 'Where is the Fool Killer?' Too much cannot be said in praise of the way in which this matter has been handled. On December 8th there was received in our office a circular letter about the proposed consolidation. The writer at that time considered the advisability of communicating with you relative to giving this matter the lie, but considered the time was too short to have anything placed in last week's issue. It is characteristic of your paper to take up affairs of vital interest to the Independent movement, but in this case you seem to have been unusually energetic, and as such energy is timely, we wish to congratulate you."

"Yours very truly,
"ONTARIO TELEPHONE COMPANY,
"(Signed) J. F. STOCKWELL, *Gen. Mgr.*"

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—DECEMBER 17, 1904—CHICAGO Number 25

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Contents, Page 2. Advertisers' Directory, Page 9.

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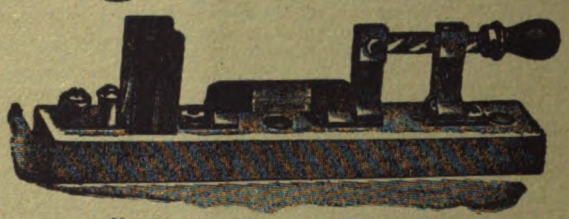

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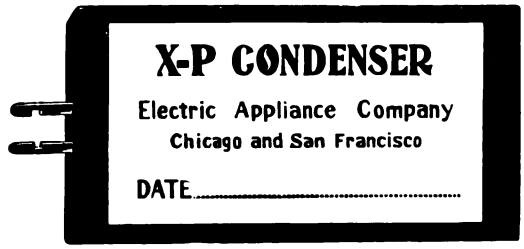

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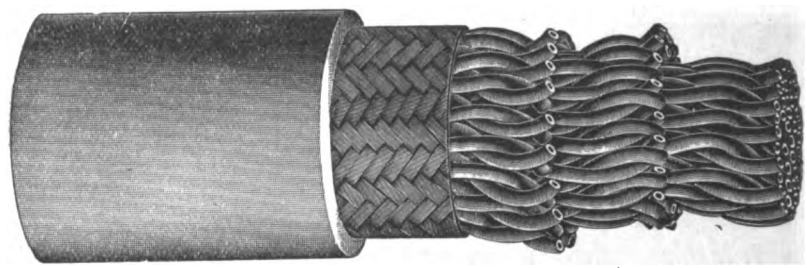

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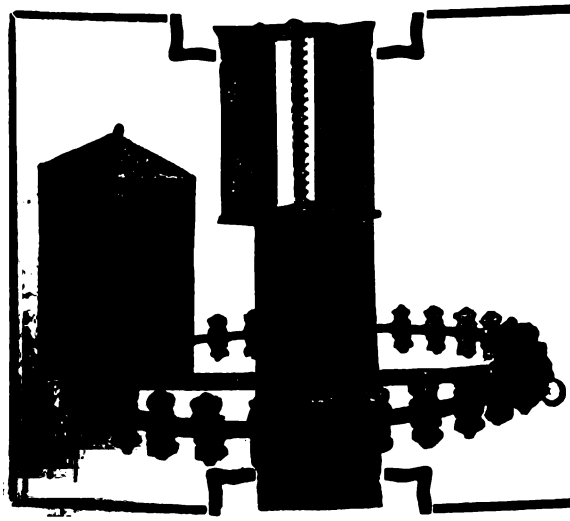

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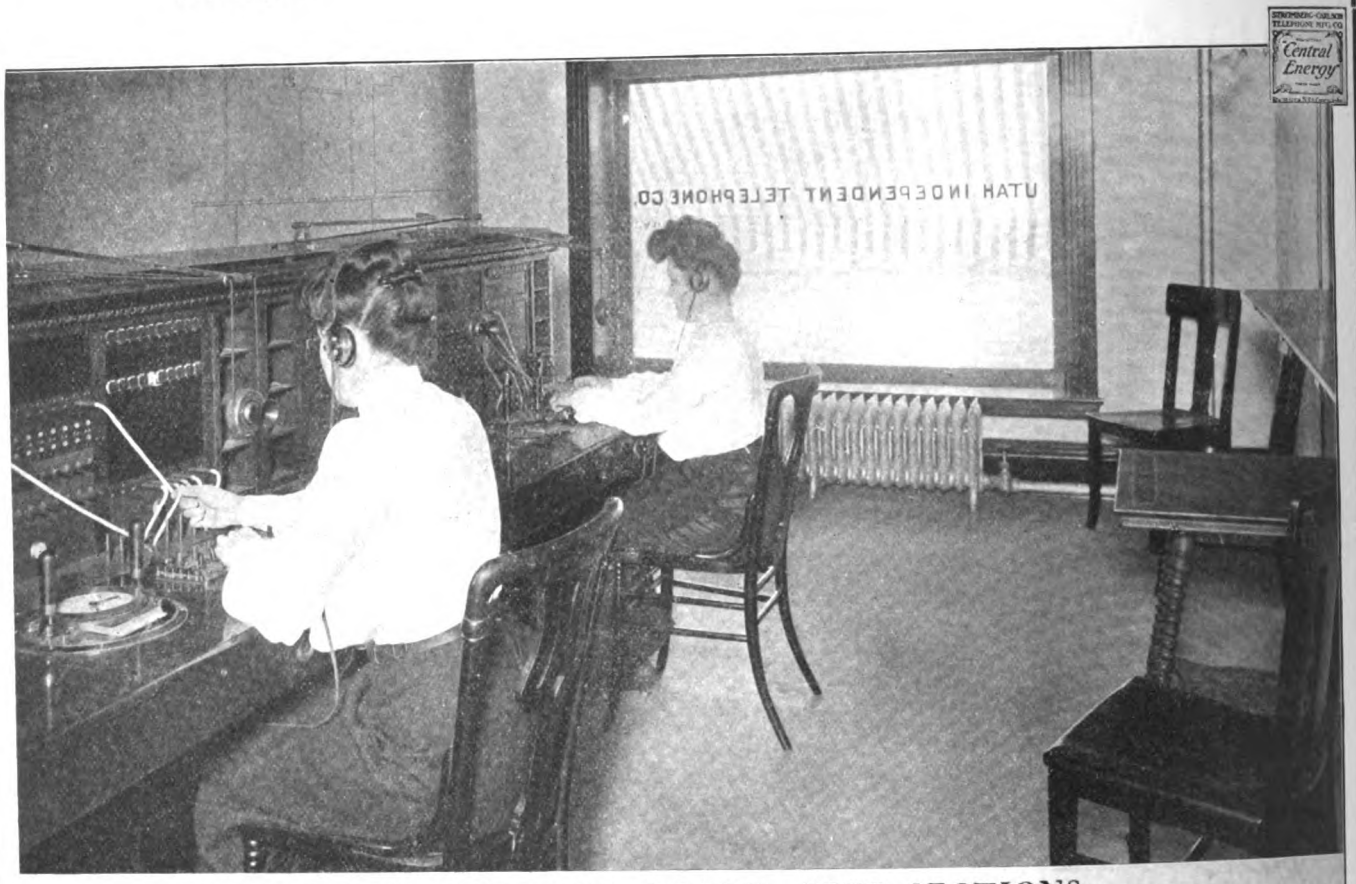
STROMBERG-CARLSON TOLL BOARDS

This illustrates one page taken from our Toll Board Bulletin No. 12-B.

The information we give on the subject of "Toll Equipments for Telephone Exchanges" should be of value to every exchange manager.



FOUR-POSITION TOLL BOARD—TWO SECTIONS
CABINET No. A-2474
AS OPERATED BY
UTAH INDEPENDENT TELEPHONE CO.
SALT LAKE CITY, UTAH

No other catalog or bulletin ever issued deals with this subject so extensively.
We are glad to mail a copy to managers interested in this subject.
Just ask for Bulletin No. 12-B.

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General Offices,
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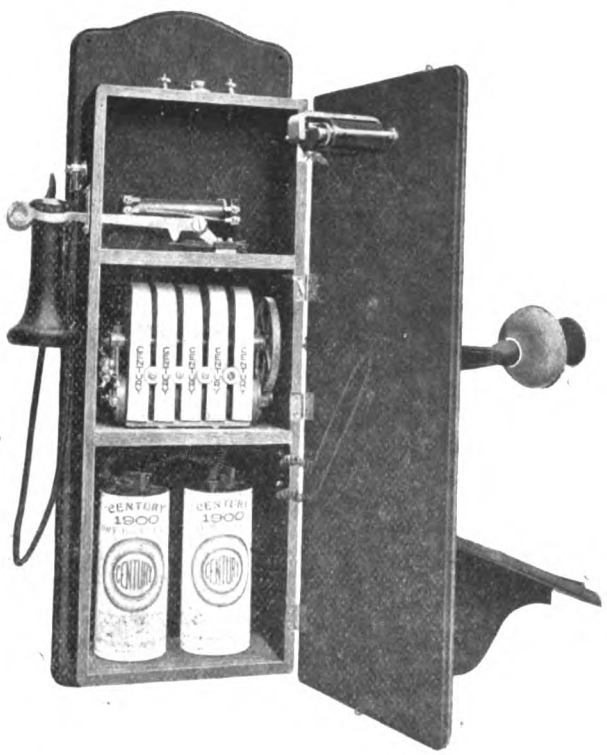

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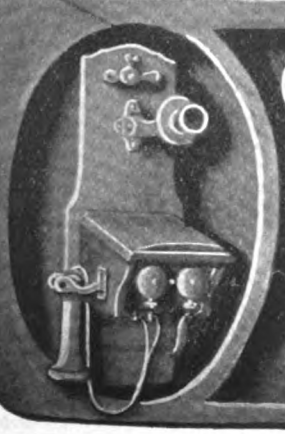

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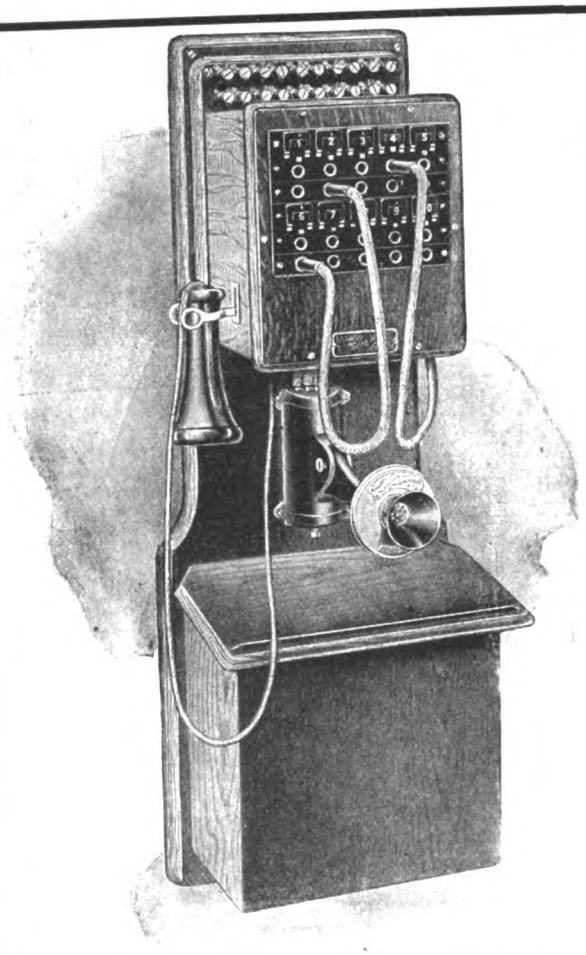

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Intercommunicating

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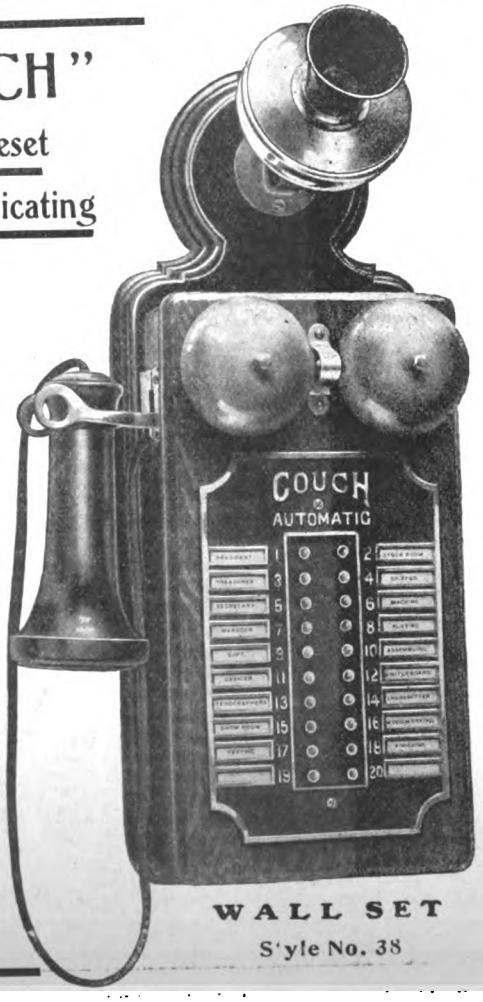

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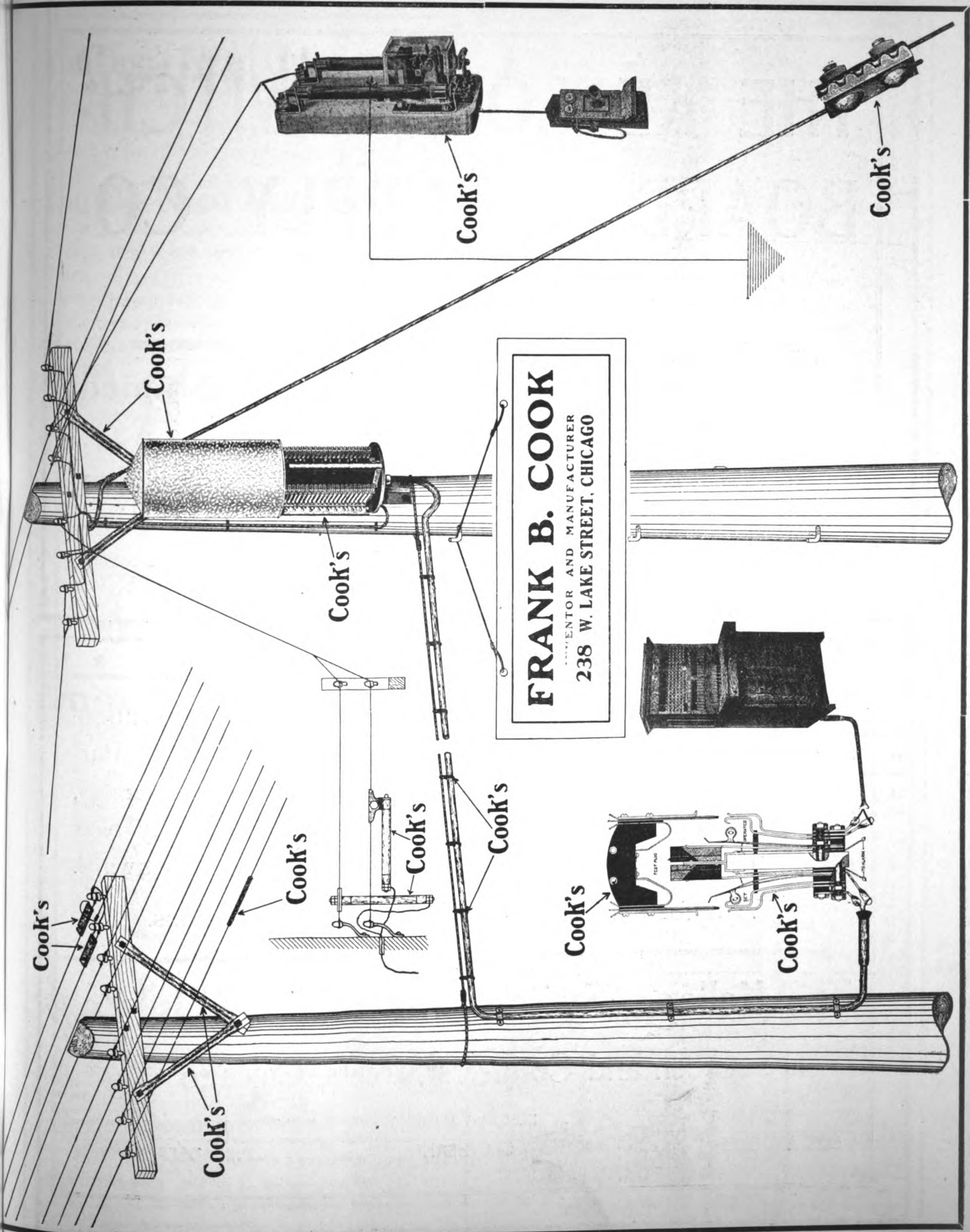

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But if you have rural party lines and wish to give subscribers the advantages of private lines,

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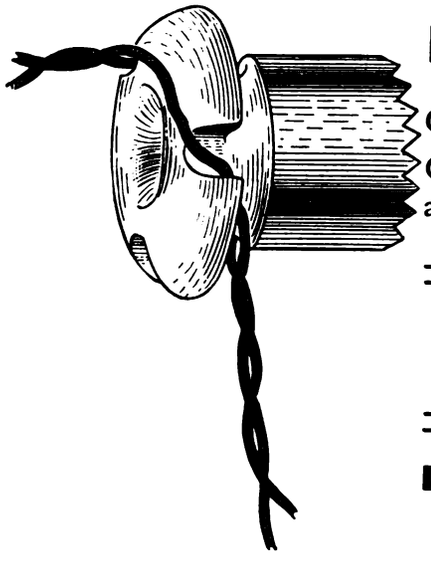

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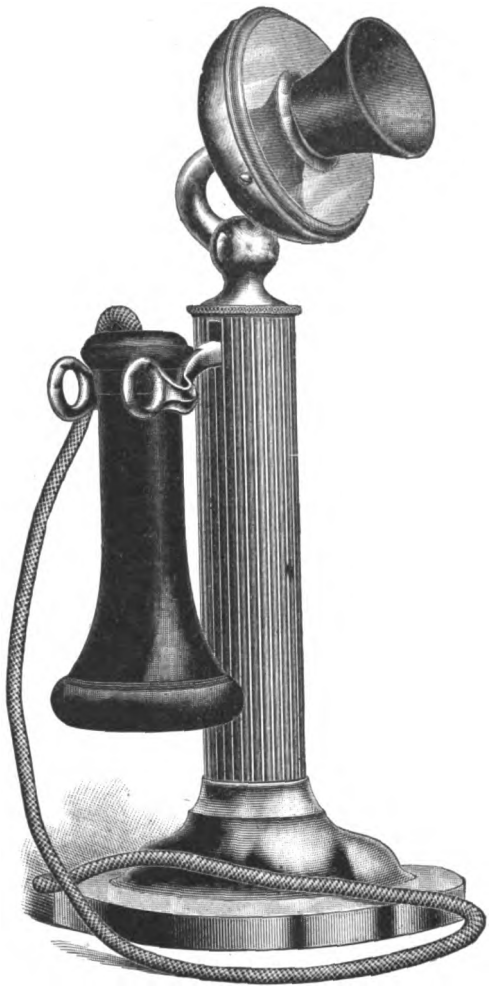

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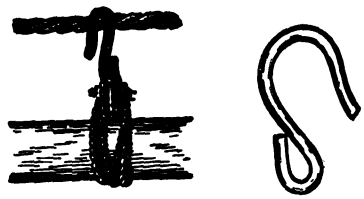
Made to fit any size cable.



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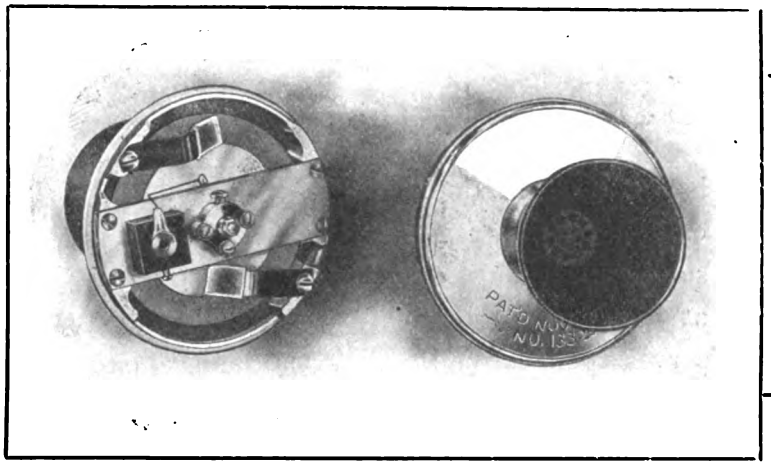

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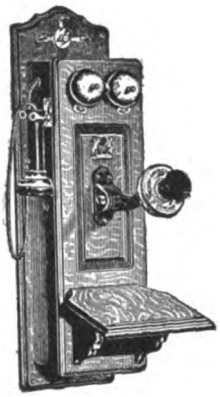

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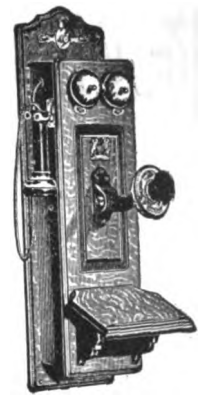
OUR APPARATUS

is the result of time, energy, brains, experience, hard work and money, and has resulted in placing our equipment distinctly at the head of the list. Our product deserves your recognition. Prices and apparatus right. Your inquiries solicited.



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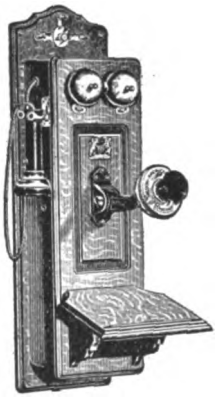

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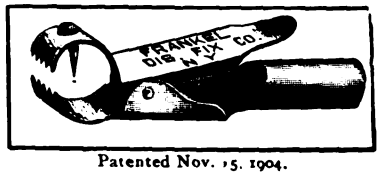

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In 1 Dozen lots, 12½c. each
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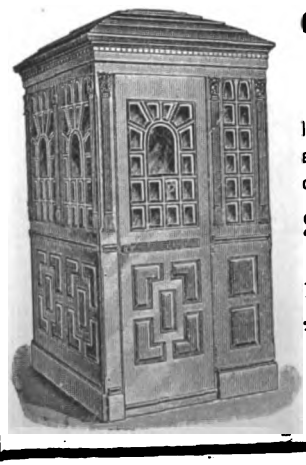
ASK YOUR SUPPLY HOUSE FOR THEM.



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Make a memorandum to dictate a letter to your stenographer to-day asking for prices and descriptions of our

SOUND PROOF BOOTHS

When you get one you'll order at least a dozen more.

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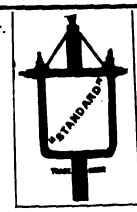

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VOLUME 10 *SATURDAY, DECEMBER 17, 1904* *NUMBER 25*

INTERSTATE CONVENTION VOTES FOR CONSOLIDATION.

By Telegraph to THE AMERICAN TELEPHONE JOURNAL.

AUDITORIUM CONVENTION HALL,
CHICAGO, Dec. 15.

THE fight for the consolidation of the two national Independent telephone associations has been won. The Interstate Association, at its convention here, has voted in favor of the proposition. The advocates of consolidation had a substantial majority from the start, and when it came to a vote their triumph was complete.

A committee of five was appointed to arrange the details of consolidation, and to meet a similar committee of five from the National Telephone Association of America. The joint committee was empowered to call a convention of the two associations, at which the general plans under which the consolidation is to be effected are to be presented for final ratification.

The committee appointed to arrange for consolidation consists of:

Theodore Gary, of Macon, Ga.
L. L. C. Brooks, of St. Paul, Minn.
H. F. Barnhart, of Rochester, Ind.
E. M. Coleman, of Louisville, Ky.
C. E. Hull, of Salem, Ill.

The convention was held at the Auditorium Hotel, Chicago, on Dec. 13, 14 and 15. The meeting was called to order the first day by President Barnhart. After attending to business on hand, the main topic of the convention was the consolidation of the association with the national body. The general trend of events has been toward this consolidaton, since the success of the Independent movement necessitated concerted powers which could only be attained through the medium of one representative body.

Now that this much-wished-for result has been consummated, the future welfare of the Independent movement is assured; and an equally important point gained is, that an organization as well officered and managed as the Bell will be brought to bear upon the cause of any Independent company that may be in danger of the opposition. The organization of the whole country in accordance with the "Ohio Idea" will now be aggressively pushed, so that immediate benefits may accrue where, in the past, the Independent movement has only been able to move in a restricted manner; the new order of things will open up and develop territory in a most aggressive way, and the tactics of the Bell company, which have tended to hinder development, will now be met with an organization as powerful and resourceful as itself.

That the time is now ripe for such a movement is only too evident. Here and there throughout the country the Bell has been singling out the most defenseless companies, and, like a vulture swooping down upon its prey, has gobbled up the faint-hearted. Its tactics have been mostly under cover, and so devised as to shoot terror into the hearts of its victims. Its newest plan, and one of the most insidious, although but partially successful, is to admit itself beaten, and to offer to withdraw from a territory upon conditions of securing the toll and long-distance business of the company. Just why some of the Independents have allowed themselves to be buncoed by such a scheme is not apparent, but it is also certain that the consolidation of the associations will put a stop to this class of business and form an overwhelming barrier to future marauding expeditions of the Bell minions.

It is to be hoped that no further delays will be allowed in the formation of the plans of consolidation, and also that the committees which have been appointed to effect the merger will be able to do so in as amicable manner as possible.

NEW OFFICERS OF THE INTERSTATE ASSOCIATION.

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A STUDY IN TRAFFIC.

By The Traffic Manager.

IN the preceding article, the methods commonly employed in making a peg count for the purpose of determining the load line upon a telephone exchange were described. As an instructive illustration a number of results from actual experience have been obtained and will be presented for the information of our readers.

These statistics have been gathered from as wide a field as possible, embracing peg counts taken from large and small exchanges, and from both Independent and Bell companies. Reports of the work of something over 1,000 operators, under a great variety of conditions, are included. A rough classification has been adopted whereby large cities are understood to mean those of one-half a million inhabitants or over; medium-size cities embrace, say, those with fifty thousand to five hundred thousand; towns are understood to mean a population of from ten to fifty thousand, while villages are such as are of a less size.

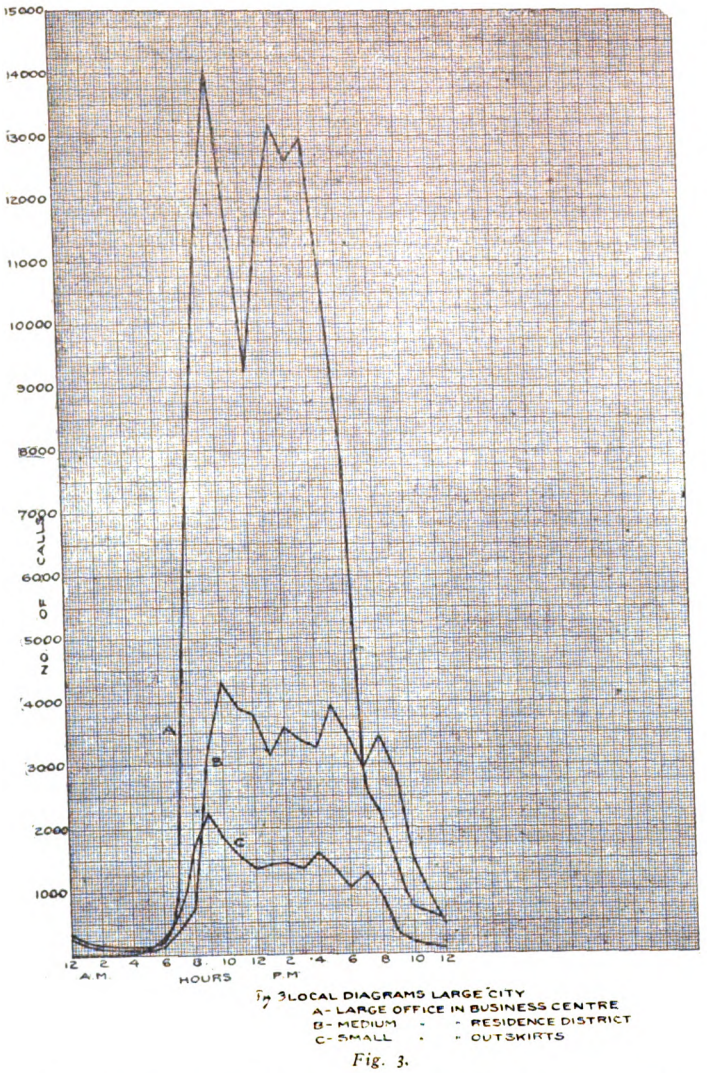

Fig. 3. LOCAL DIAGRAMS LARGE CITY
A- LARGE OFFICE IN BUSINESS CENTRE
B- MEDIUM " " RESIDENCE DISTRICT
C- SMALL " " OUTSKIRTS

Fig. 3.

The graphical method which consists in plotting the results upon a sheet of cross-section paper was the earliest form to be used, and has the advantage of presenting the progress of business from hour to hour in a manner readily to be grasped by the eye.

Fig. 3 is a diagram taken from an exchange in a large city. Three curves are shown upon this sheet. Curve *A* depicts the business of an office of from 4,000 to 5,000 subscribers in the center of the business district. Curve *B* gives the returns from a medium-sized office, say from 2,000 to 2,500, located in a mixed residence and shopping district, while curve *C* that for a small office of from 500 to 800 subscribers in the outskirts. In this diagram, as well as in all others which follow, the lower horizontal scale contains the various hours of the day, while the left-hand vertical scale gives the number of calls which were received during the successive hours. From midnight to 6 A. M. it is noteworthy that all three curves closely approach the base line, showing very little business. The minimum point occurs between 3 and 4 A. M. About 5 o'clock the load begins to increase, at 6 in all the offices it takes a sharp upward turn, reaching the maximum in the business district at 10 A. M. and in the outlying residence district at 9. From 10 to 12 the load drops sharply, showing the effect of the noon hour. In the afternoon a second peak occurs, but it is curious that this peak rarely rises to the same height as that which is attained by the load in the morning. After 4 o'clock the load line in the business district rapidly declines, the line moving almost continuously downward until midnight. In curve *B* a small peak occurs about 8 o'clock, which is due to traffic arising from making social engagements.

Fig. 4 is the diagram from an exchange in a medium-sized city. Curve *A* relating to an office in the business district, and curve *B* to one in the outskirts. As the offices were considerably smaller in size the load line is much lower than that shown in Fig. 3, but the noteworthy feature is the difference in the shape of the curve. Proportionately the load is steadier, as there is less relative difference between the peaks and hollows. This is even more marked in the case of curve *B*.

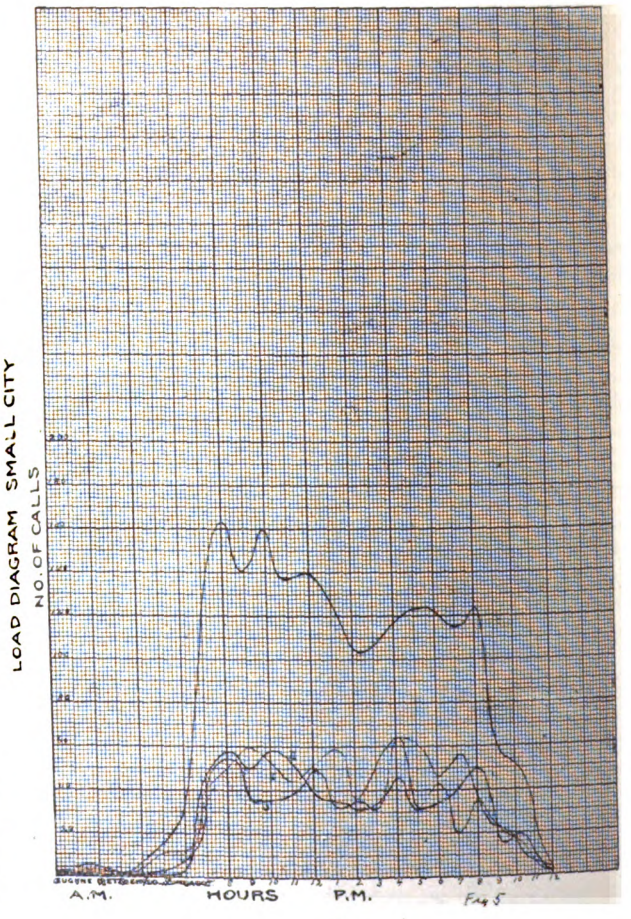

Fig. 5.

Fig. 5 is the load line from a town of about 10,000 inhabitants in a farming district. Upon this diagram, as well as upon the succeeding one (Fig. 6), the load line of each of the individual positions of the three operator boards which served the town are

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plotted. Fig. 5 is peculiar in showing two peaks, one at 8 and one at 10 o'clock in the morning, but a consideration of the habits of a rural town of this kind shows that these peaks arise from the fact that a farming community, particularly one (as was the case in the diagram under consideration), where the railway service gave two early morning trains, transacts the bulk of its business at an early hour. The lowest point in this load line occurs about 2 o'clock, which represents a different condition from that which arises in the larger cities. The afternoon peak occurs between

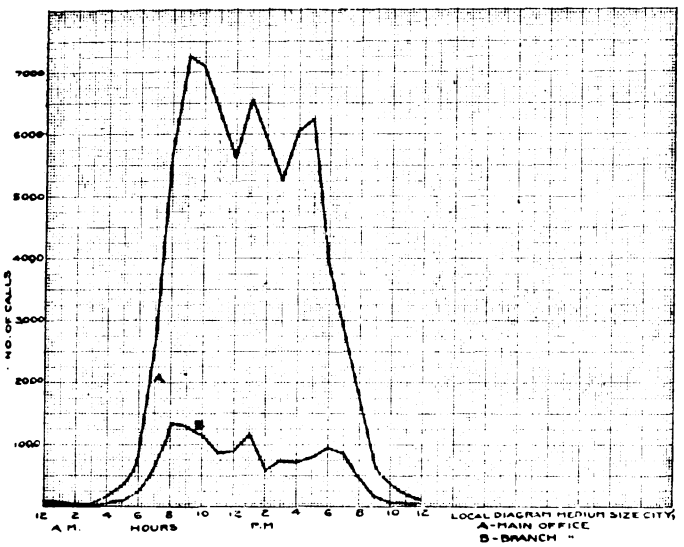

Fig. 4.

5 and 6, and in the evening at 8 o'clock there is the usual elevation due to social calls.

Fig. 6 is the load diagram of a manufacturing and railway town about the same size, and not far distant from the one represented in Fig. 5, but the load line is entirely different. There is a sharp peak at 9 o'clock and another sharp one at 5 o'clock. There is also a very distinct peak at 10 P. M. The 9 o'clock and 5 o'clock peaks represent respectively the hours of the arrival and departure of a number of trains, while the 10 P. M. peak represents business transacted by the railway shops, for it was the custom in this town for the night shift of employees to come on at 10 o'clock, and the business originated at this time is due to the change in force which then took place.

It would be easy to multiply diagrams of this kind to any extent, but sufficient examples have been given to illustrate this

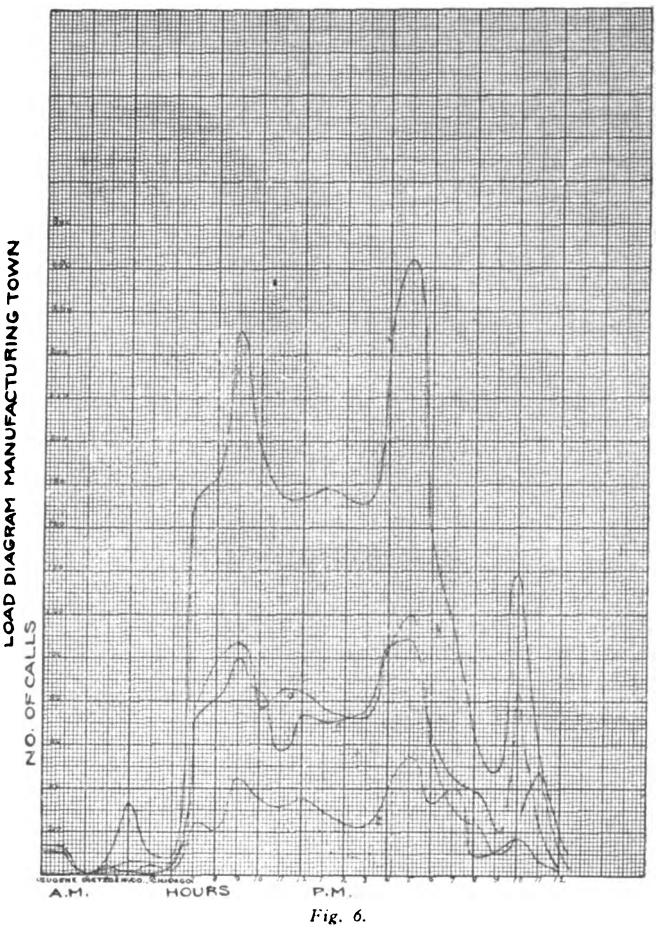

Fig. 6.

method of tabulating results of the peg count and to exhibit the lessons which the compilation of a series of diagrams of this kind can convey.

TELEPHONE COURSE AT PURDUE UNIVERSITY

THE third years' course at Purdue University, Lafayette, Indiana, which has just commenced shows a large increase in enrollment over that of last year. This department is considered by the university as one of the most valuable adjuncts to the study of electrical engineering and is consequently carried out in a most thorough manner. It was introduced at Purdue by Prof. W. E. Goldsborough, who was chief of the department of electricity at the St. Louis Exposition, and who holds the chair of electrical engineering. Prof. J. C. Kelsey, however, is at the head of the department of telephone engineering. He has had a practical experience extending over several years with both Independent and Bell companies. Besides being an enthusiastic advocate of telephone engineering for technical schools he has caused several of them, including the Ohio State University and the School of Technology, at Worcester, Mass., to consider the opening of a similar department.

The study is a part of the course in electrical engineering and may not be taken up by itself. For this reason many applications received from men who wanted to take the two-year course in telephony alone have been refused. However, juniors and seniors may take it in preference to thermodynamics and steam engine and boiler work. Prof. Kelsey has now twenty-five students in his class, with the prospect of 100 per cent. increase next year. Manufacturing concerns at first aided the department by giving or loaning equipment, but the University is now independent, buying what it needs and the best the market affords. The laboratory contains almost every type of switchboard and telephone apparatus, which are dissected and studied from beginning to end. The introduction of the automatic telephone created a great deal of interest in the department since it obviously reduced the working force at the switchboard and created the necessity for more expert telephonists to take charge of the lines and exchanges. A demand for these men is growing and the chances for the employment of Purdue's graduates are always good. The students use a fully-equipped exchange having an ultimate capacity of 1,000 lines.

MOTION TO RAISE BOND.

ANOTHER point in the fight of the Illinois Manufacturers' Association against the Chicago Telephone Company has been decided adversely to the latter in the Circuit Court. Judge Tuley has refused a motion of the defendant to force the association to increase its bond of $10,000, filed in court as an indemnity against loss to the telephone company. Allegations were made by the company that many of the 1,100 complainants in the suit to lower telephone charges are irresponsible financially.

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A HOME MADE POLE CHANGER.

By Arthur Riche.

EXPERIENCE has shown that a pole changer is an exceedingly desirable and economical device for the small exchange, whose small size is hardly sufficient to warrant the necessary expenditure for the electrical machinery required in the installation of a ringing dynamo. There are very many instances, particularly as the small exchange increases its capacity, when it is practicable for the wire chief to construct a pole changer out of materials at his hand, and thus avoid the expense of purchasing a machine outright. So, the object of this article is to describe a method that has been successfully put into practice for accomplishing this result.

The materials required are: A board for a base, 5" × 9"; one 3" gong iron box vibrating bell; one ½ M. F. condenser; one single contact relay of not over 80 ohms resistance; six brass binding posts, such as may be taken from old dry batteries; eight platinum hook-switch points; four strips of brass, ⅜" × 1¼"; six inches of light watch spring; a few screws, etc. The bell should be prepared by cutting the frame at the edge of the gong and cutting the hammer rod so as to leave ½" of stub. To this stub solder a piece of No. 12 iron wire 4" long, which has been flattened slightly.

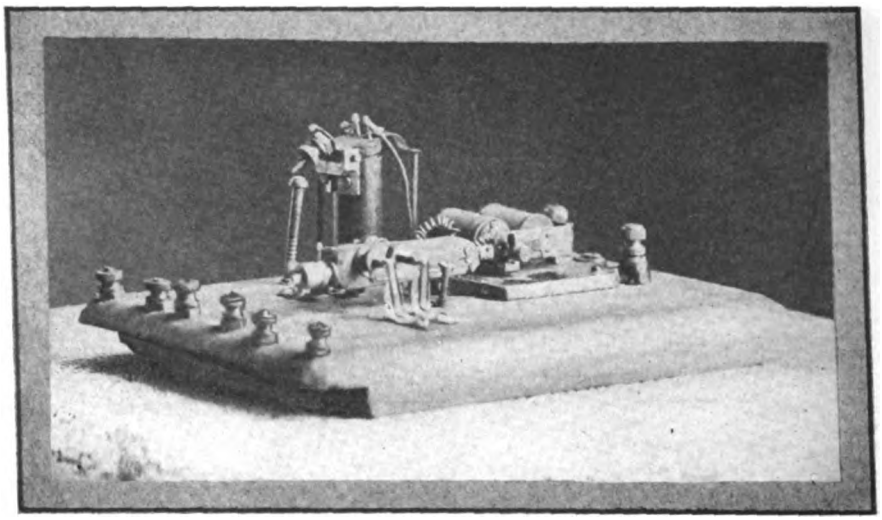

Fig. 1.

Slip over the wire a piece of hard wood, 3" × ¾" × ⅛", which has two 3/32" holes ¾" apart, as shown at *e*. It may be well not to dress the wood down to dimensions until after it is bored and in place. Place in the two holes two contact pins, made by cutting off the heads of two binding posts and soldering to each end of both platinum points. Place some sort of a light weight on the end of the vibrator, with which to govern the rapidity of its vibration, which should be about twenty complete vibrations per second.

Screw the vibrator to the base, which has been smoothed and varnished, and so adjust it that the points shall be one inch from the base. Cut four pieces of brass, as shown at *a*, and solder to them pieces of spring, as at *c*, and bend together, as at *b*. Bend the spring so it will have only a slight tension against the brass. It will be necessary to draw the temper in the springs, as they are too brittle without. Carefully punch the holes for the platinum points and solder them in on the back, as the springs will not bear much riveting.

Screw these contact brushes to the base so that the points on the pins will strike the points in the springs quite firmly when the vibrator is run with one cell of dry battery. Be sure that both contacts on one side make and break at exactly the same time.

Mount the relay in the most convenient manner and make all connections, as shown at *e*. Connection to the contact pins should be made by means of wires brought to the end of the vibrator tongue and connected to posts driven in the base, by flexible cords or coils of wire, as is plainly shown in Fig. 2. The condenser may be mounted on the bottom of the base and the machine raised on short legs or the connections brought out to binding posts, as shown in Fig. 1. The machine will work much better if held firmly and not allowed to vibrate as a whole.

While this machine may appear crude in comparison with the purchased article, when carefully made it will give very little trouble and requires no attention. We have one in our office, made from odds and ends, which has been running for some time without a stop and ringing the longest, hardest, country lines. We use three cells of gravity battery, connected in mul-

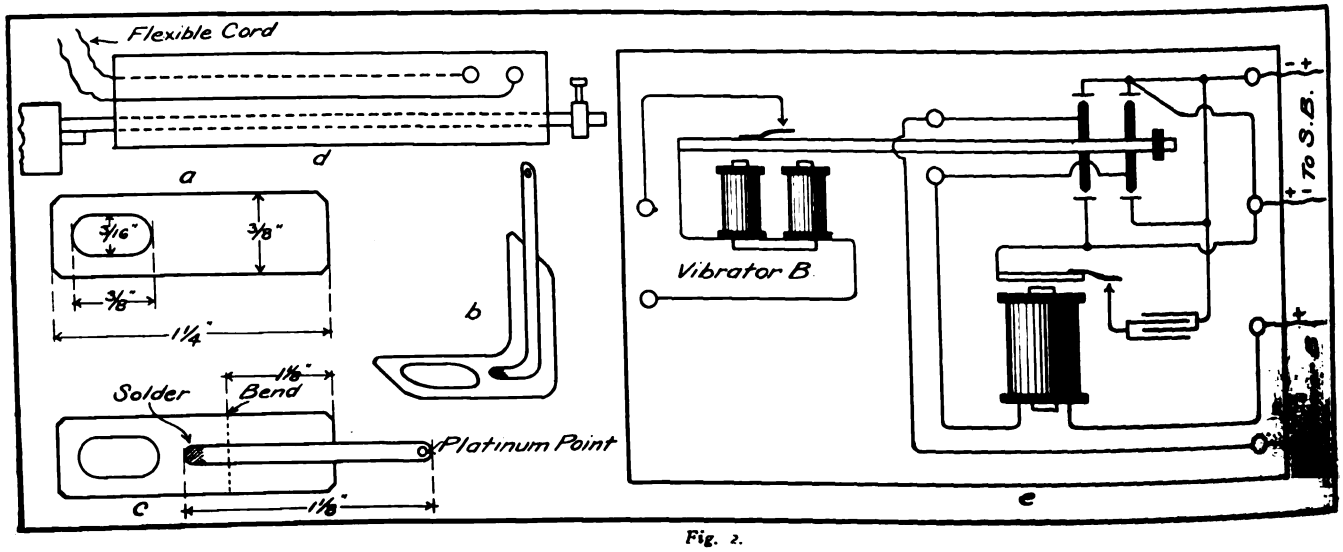

Fig. 2.

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tiple, to run the vibrator, and fifty cells of "1900" battery for the power, and they do the work in good shape.

When the materials are bought outright the cost will stand about as follows, as compared with the $25 that a factory-made instrument would cost:

Base	$0.25
Bell	.35
Condenser	1.00
Relay	2.00
Platinum points	.80
Brass and binding posts	.25
Screws, wire, etc.	.25
	$4.85

Even this small cost may be greatly lessened in many instances, for a large part of the required material is found in the junk heap of nearly every exchange. A very good substitute for a relay may be made from an old drop by soldering on a piece of brass for a contact and a binding post for a counterbalance. Or even the windings of an 80-ohm bell may be made to serve.

A PRACTICAL WAY TO TURN A CORNER

By William H. Elges.

QUITE frequently the construction of rural lines does not meet with the attention and consideration for its various details as it should, and consequently where a line should have cost a stated amount, before it has been completed the expenditure has been largely increased over the original estimate. The proper location of poles and their distribution with regard to strains and locality is as important as the switchboard, in fact even more so, because the various manufacturers design their apparatus for a certain specific end, and have used their utmost ability in engineering skill to secure results; whereas the builder of a rural line quite frequently has no further knowledge of the business than that gained by a casual examination of other pole lines or what he might have received from any books upon the subject.

To turn a corner in a simple manner and yet have the line

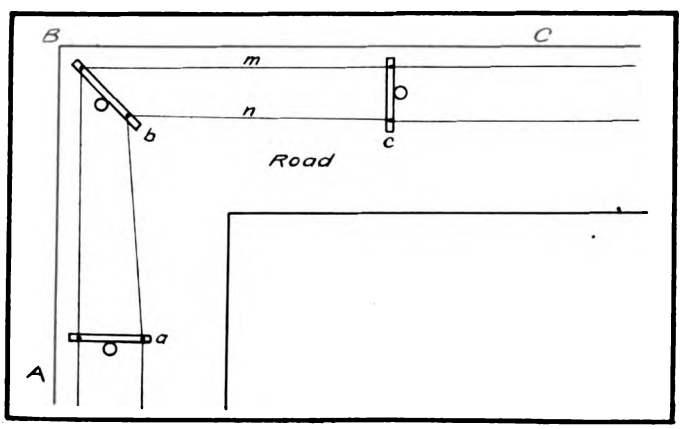

Fig. 1.

substantial is a very important part of its construction, and if not carried out with the best knowledge of line practice gives frequently a large amount of trouble. Aside from the matter of stringing the line there is the liability of crosses occuring at this point which result in a great deal of time and money being lost in cleaning. Take for example Fig. 1, in which *A*, *B*, and *C* represent a turn in the road and *b* the corner pole and for ease in describing let there be only two wires, *m* and *n*. Now, if *m* and *n* are 6 inches apart at *a* and *c* and the distance between the insulators at *b* is 6 inches, and also if the arm *b* has an angle of 45 degrees with the crossarms *a* and *c*, the distance of the wires *m* and *n* from each other at *b* is only 4.2 inches, which is 2 inches closer than at other points along the line. There are two ways of overcoming this difficulty, one is shown in Fig. 2 where *A*, *B*, and *C* represent the turn in the road and *d* and *e* are poles used at the corner. With this method the wires *m* and *n* are only brought closer together between the arms *d* and *e* and in such a short distance there is no danger of crossing.

This construction, however, requiring two poles and additional crossarms and guide wires is unnecessary and too costly, except in extraordinary cases.

Fig. 3 represents the best and most economical method of turning the corner. In this case *A*, *B*, and *C* represent the turn

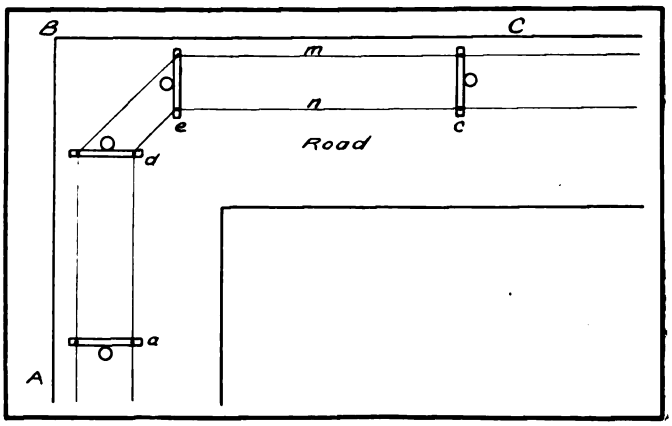

Fig. 2.

in the road, and *b* the corner pole. Upon *b* mount two crossarms at right angles *x* and *y* so that *y* is parallel to *a* and *x* to *c*. The wires *m* and *n* and *m'* and *n'* should be run in the usual manner and dead ended at the knobs at the crossarms at *b*. To cross connect the lines, it is good policy to use insulated wire which renders the possibility of crosses from any cause almost impossible. When line construction similar to this is used the maximum efficiency and the minimum of cost is ob-

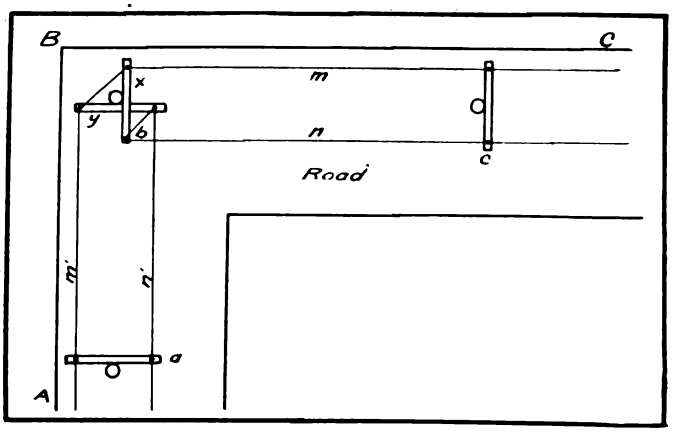

Fig. 3.

tained and the necessity for using more than one guy wire is done away with.

It has been the writer's purpose to describe in a few words one of the simple problems in line construction with the idea of showing where money can be saved both in construction and maintenance, since it is only by excellence of construction that the great bugbear of a telephone system "maintenance" can be kept down.

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IN THE OPERATING FIELD.

CENTRAL NEBRASKA TOLL ASSOCIATION ORGANIZED.

AT a meeting of the leading Independent managers and stockholders of the State, held recently, the Central Nebraska Toll Association was organized for the purpose of generally bettering conditions. At the meeting was represented telephone interests in the leading counties of the State possessing about 1,000 miles of toll lines. The companies represented were the Hamilton County Telephone Company, the Grand Island Telephone Company, Kenesaw Telephone Company, Sheldon Telephone Company, Ravenna Telephone Company, Kearney Telephone Company, Kearney & Northwestern Telephone Company, Phelps County Telephone Company, Elm Creek Telephone Company.

LEWIS COUNTY, MO., TELEPHONE COMPANY ISSUES NEW DIRECTORY.

THE Lewis County, Mo., Telephone Company has recently issued a new directory which more than anything else illustrates the growth of Independent lines in Missouri. This directory consists of 114 pages and lists upwards of 1,500 names. A separate page or pages is devoted to each exchange and all toll and party lines are arranged separately. An alphabetical list is given of all subscribers so that the name of the party, line, and signal, can all be obtained at a glance. The Lewis County Telephone Company has exchanges in the following places: Alexandria, Antioch, Argola, Benbow, Benjamin, Bunker Hill, Canton, Colony, Deer Ridge, Derrahs, Durgan, Durham, Edina, Emerson, Ewing, Gregory, Hester, Hahoka, Knox City, Labelle, La Grange, Laura Lewiston, Maywood, Monticello, Neeper, Nelsonville, Newark, Palmyra, Santuzza, Sellers, St. Patrick, Steffenville, Lalor, Ten Mile, Salona, Wayland, Williamstown, Winchester, Wyaconda. Besides the general system over 100 county and toll lines are given.

The Lewis County Telephone Company has made a very large number of improvements in the past and contemplates extensive additions to its system for next summer.

GROWTH OF HOME COMPANY AT FORT WAYNE.

A RECENT report issued by the Home Telephone Company of Fort Wayne shows a very creditable growth and financial condition. At present there are over 3,300 telephones installed and new contracts are being secured at an average rate of fifty a month. The company owns its own building worth $40,000 and it has $32,000 in the sinking fund for the redemption of $250,000 outstanding 6% bonds. Six and a quarter per cent. is set aside yearly for the sinking fund and 2% is paid on the stock. At the recent election Charles S. Baseh was reelected president, W. L. Moorlling secretary, and M. B. Fisher treasurer.

INDEPENDENT SYSTEMS AROUND JONESVILLE, MICH., STAND FIRMLY AGAINST BELL.

AT a recent meeting of Independent telephone men interested in exchanges in the neighborhood of Jonesville, Mich., a strong stand was made to oppose the Bell Company. John Fitzsimmons, the manager of the Hillsdale exchange, introtruced a proposition whereby the Independent rural lines would connect with the Bell Company. After occupying the floor for a considerable time explaining an interchangeable contract he could make with the Bell, the following speakers made addresses calling attention to the success the various Independent companies had had and plainly demonstrating the undesirability of such a contract: J. C. Smith, manager Jackson City Tel. Co.; W. H. Smith, president Coldwater system; E. L. Miller, manager Wolverine Tel. Co., Coldwater; Samuel Knect, Lester; Edward H. Rice, Alagansee; Whit Shepard, South Allen; L. H. McClave, John Condra, Allen; Ward Noble, John Babcock and C. A. Bailey, Quincy; D. B. Scripture and Eber C. Farwell, of Butler.

The chairman then called for a vote upon the matter, asking all those who were satisfied with their present system and were in favor of cutting out all the Bell connections and all switches that had Bell connections to stand up. Every person in the room stood up but Fitzsimmons.

RESULT OF COMPETITION IN GREENFIELD, IND.

THE result of Independent competition is well illustrated by the results obtained at Greenfield, Ind. Since the Citizens' Telephone Company entered the field a year ago the long distance rates to Indianapolis have been reduced to 15 cents, which is a rate much lower than is charged by the Bell company to points a great deal nearer. The popular feeling is in favor with the Independent company, which is giving excellent service, and it seems that the city departments will hereafter rely entirely upon the Citizen's service.

OPERATORS RULES OF ROCHESTER TELEPHONE COMPANY.

THE Rochester, N. Y., Telephone Company has recently issued a book of rules for the guidance of its operators. These rules are intended to cover almost every condition of operating and apparently have been compiled with a great deal of care. The wording of the various items has been so arranged as to exactly indicate what is meant without the expression being harsh and blunt, as is unfortunately quite often the case. A good deal more attention to rules would be general were they compiled with a careful regard for language in expression than is the case when the imperative character of the phrases is brought out by the too frequent use of must and shall.

Besides the rules a list of numbers and parties is printed which each operator is requested to memorize. These include large business houses, fire, police and hospital telephones, theaters, express, freight and passenger offices, messenger companies, newspaper numbers and the offices of the gas and electric companies, besides the calls of the various departments of the telephone company. The book is tastefully gotten up in a size easily carried, and is intended to be a *vade-mecum* for the best interests of the operating force.

OHIO VALLEY COMPANY RECONSTRUCTING SYSTEM AT BELLAIRE.

WORK on the installation of the new plant of the Ohio Valley Telephone Company at Bellaire, O., which was commenced recently, is now progressing rapidly, and it is expected to have all the underground work completed before cold weather makes such work impossible. It is a fact not generally known that the company will install an entirely new system in every detail and not a portion of the present equipment will be used. The new plant will be constructed upon the most up-to-

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date plans and will be equipped with the latest improved apparatus. Everything will be new, from the wire up to the central office building, which is now in course of erection.

The contract for the installation of the new system has been let to the Mountain State Electric Company, of Wheeling, and the work is being done under the personal supervision of Mr. Frank Hall, of that company, who recently returned from Salt Lake City, Utah, where he installed a large plant. He is being ably assisted by H. C. Fuhr, of Bellaire, who recently resigned his position as chief electrician for the Bellaire Steel Works. The new cables to be used by the company will on certain streets of the city be placed under ground, the excavating for the conduits being now in progress. The construction of this work has been delayed somewhat by the inability to secure workmen, since Mr. Fuhr refuses absolutely to employ any class of foreigners.

RESTAURANT TELEPHONE SERVICE IN INDIANAPOLIS NOTED.

"TELEPHONE while you eat" is the caption of the menu card at the Denison Hotel grillroom in Indianapolis. A system has been installed whereby patrons can telephone to their friends, make engagements, transact business, order a carriage or theater tickets without leaving the dining chair. This innovation is due to the enterprise of President George Fulwell, of the Denison, and it is proving quite popular.

NEW PLANT FOR CITIZENS' CO., OF COLUMBUS.

THE Citizens' Telephone Company, of Columbus, O., is doing its utmost to hurry the completion of its new building. This building will be four stories high, the upper floor being designed for the automatic switchboard. This room is 90 by 90 feet, and will afford ample space for the apparatus. The balance of the building, except the ground floor, will be occupied by the company for its offices.

The Citizens' Company was one of the first of the larger Independent companies in the State of Ohio, and from the commencement its success has been phenomenal. Hundreds of contracts have been received, which the company was unable to complete on account of lack of apparatus for periods varying from one to two months, notwithstanding the fact that the line and switchboard capacity was being continually augmented.

A large amount of the credit for this progressive company is due to its manager, Frank L. Bear, who has been with it since its organization, and has always pursued the aggressive policy which has helped to place the company where it is to-day.

THE P. & A. AT McKEESPORT.

THE Pittsburg & Allegheny Telephone Company has paid particular attention to the development of its exchanges in the territory tributary to Pittsburg, and in almost every instance has secured more subscribers than the Bell. At McKeesport, where it installed a new exchange last June, it has over 1,500 subscribers. At the time the exchange was opened the Bell company, which had been located there for years, had only 750 subscribers, and the Federal Telephone Company, the pretentious rear-end appendage of the Bell interest in Greater Pittsburg, had less than one-half that number.

Fully 75 per cent. of the P. & A. service at McKeesport has been installed on the nickle basis, which is proving immensely popular with subscribers and correspondingly profitable to the company, which is the pioneer in this method of service.

A SPARE PAIR RECORD

By Harold A. McMann.

A HANDY record for obtaining at all times a status of spare pairs in a cable or at a terminal is herewith shown and described.

The lay-out of the sheet is clearly indicated in the drawing; this may be either printed in a convenient book or adapted to the universal and flexible card system.

Suitable spaces are left at top of the form for the number of the cable, the name of street on which it runs and a line for brief remarks that may be found useful for noting the condition of the cable, and spaces for number of spares, district, etc.

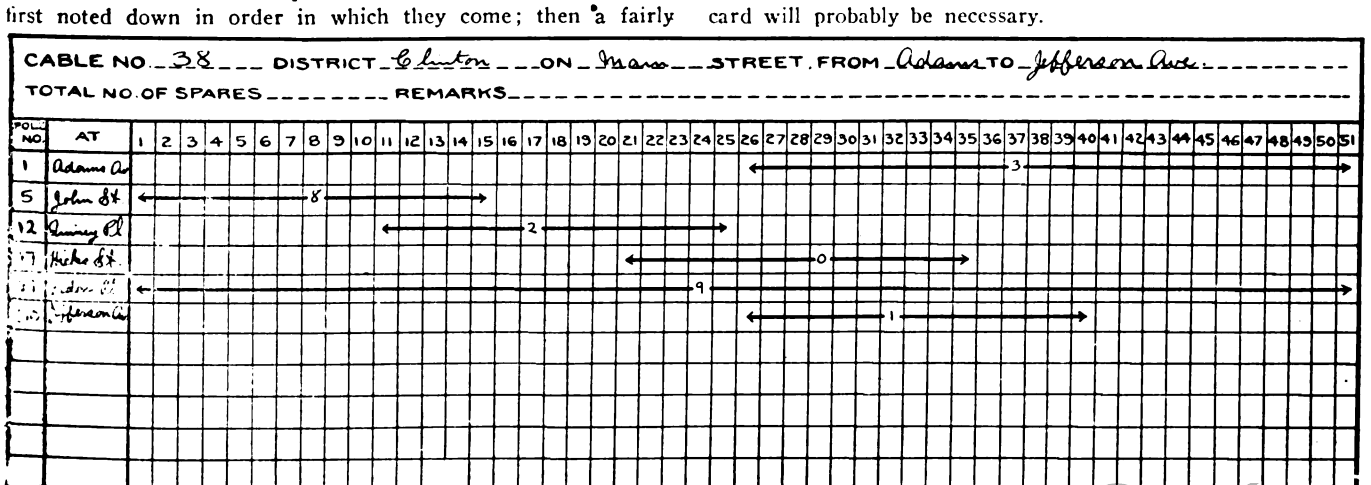
On the left hand side of the sheet columns are provided for the different terminal poles and streets at which they are situated.

The rest of the sheet is divided into fifty-one columns, each column representing a pair in the cable and accordingly numbered

The method of using this record is as follows: Suppose an aerial cable has been run upon a certain street and the report of the work turned in at headquarters. The different terminals are first noted down in order in which they come; then a fairly heavy line is drawn from the first pair in the terminal to the last and a small arrow placed at each end of the line. It is a good scheme in drawing this line to leave a small gap in the middle of it; this is for the accommodation of whatever spare pairs there may be in the terminal. They are generally put in pencil, and changed as required to keep the record up to date.

This record is also very useful to obtain the number of overlapping pairs between two or more terminals; the record being partially graphic, it is only necessary to glance at the lines where they parallel each other to obtain this information. Take poles 5 and 12 as an example. Pole 5 takes pairs 1 to 15 and pole 12 11 to 25; thus, between pairs 11 to 15 they parallel and consequently overlap.

The above-described record may be used for underground cables by increasing the number of columns for the pairs, a good plan being to run, say, from 1 to 51 on one-half the card and 52 to 101 on the other. If the cable is larger than 100 pairs more than one card will probably be necessary.



A Handy Cable Record.

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INDEPENDENT SYSTEMS IN CARNEGIE PLANTS.

THE Pittsburgh and Alleghany Telephone Company has added another to its long list of signal victories over the Bell trust by capturing practically all the telephones in the immense works of the Carnegie Steel Company, at Homestead, eight miles above Pittsburgh on the Monongahela river. A total of 183 telephones have thus been transferred to the P. and A. service and will stay there for at least five years according to the contract. The Central District Printing & Telegraph Company, the Bell company in Pittsburg, has thus lost all but six of its telephones in these works. It will take 12,000 feet of telephone cable in addition to the wires to equip the plant. Just how badly the Carnegie Company wanted the P. and A. service is proven by the fact that it pays more for it than the Bell officials offered their service for.

The P. and A. company now controls the service in the Carnegie plants at Duquesne, where it replaced the Bell service over a year ago, and also has the Carnegie works at Youngstown, Warren and Niles, Ohio, and Sharon, Pennsylvania, in addition to several of the Carnegie plants in Pittsburg. Private exchanges have been installed in all these plants. This gives the P. and A. company practically all the Carnegie plants except those at Monessen and Donora, Pennsylvania, which have 12 and 14 telephones respectively.

The above news item should prove of interest to every Independent operator for several reasons. In the first place, it conclusively proves that the Independent companies furnish better service than the Bell. If it did not, the Carnegie Steel Company would never have considered it for a moment, and it is equally certain that it would not allow any suspicion of sentiment to alter its views. Secondly, it is reasonable to suppose that such big plants as these must be in constant communication with a very great number of parties. If the P. and A. couldn't have furnished the local service desired, it could not have secured the contract. Another determining factor was the ability of the Independent company to give long-distance connections. It isn't so very long ago when this would have been impossible, except in a limited way, but so much progression has taken place in long-distance line construction that, with few exceptions, every city and town in Pennsylvania, New York, Ohio, West Virginia, Indiana and Illinois can be reached over Independent lines, besides a vast number of towns and cities in the adjoining States not mentioned.

Henceforth it would seem that this cry of the Bell that "you can't get long-distance service without using our lines" will be ridiculous, and thus the last straw which gave the enemy any supposedly exclusive hold upon the telephone industry has been swept away.

ILLEGAL USE OF A TELEPHONE.

AN interesting case arose in North Carolina over the refusal of a telephone company to install an instrument in a disorderly house. The keeper of the house sought mandamus to compel the company to comply with her demands and accord to her the privileges afforded to other subscribers to the telephone exchange operated by the defendant in the town. It was admitted by the plaintiff that she was engaged in an illegal pursuit and demanded equal rights with other subscribers.

In its opinion the court said that it was true that a telephone company was a common carrier of intelligence and must operate without discrimination affording "equal rights to all, special privileges to none." The court continued: "But while it is true there can be discrimination where the business is lawful, no one can be compelled, or is justified, to aid in unlawful undertakings. A telegraph company should refuse to send libelous or obscene messages, or those which clearly indicate the furtherance of an illegal act or the perpetration of some crime. But recently in New York the telephone and telegraph instruments were taken out of 'pool rooms' which were used for the purpose of selling bets on horse races. Keeping an illegal house was an indictable offense at common law, and is still so in this State. One who leases a house for the purpose of its being kept as an illegal house, or with the knowledge that it will be used for that purpose, is indictable. A mandamus will never issue to compel a respondent to aid in acts which are unlawful.

"It is argued that a common carrier would not be authorized to refuse to convey the plaintiff because she keeps an illegal house. Nor is the defendant refusing her a telephone on that ground, but because she wishes to place the telephone in an illegal house. A common carrier could not be compelled to haul a car used for such purpose. If the plaintiff wished to have the telephone placed in some other house used by her, or even in a house where she resided, but not kept as an illegal house, she could not be disbarred because she kept another house for such unlawful and disreputable purpose. It is not her character, but the character of the business at the house where it is sought to have the telephone placed, which required the court to refuse the mandamus. In like manner, if a common carrier knew that passage was sought by persons who are traveling for the execution of an indictable offense, or a telegrapn company that a message was tendered for a like purpose, both would be justified in refusing; and certainly when the plaintiff admits that she is carrying on a criminal business in the house where she seeks to have the telephone placed the court will not, by its mandamus require that facilities of a public nature be furnished to a house used for that business.

"For like reason a mandamus will not lie to compel a water company to furnish water, or a light company to supply light to a house used for carrying on an illegal business. The courts will enjoin or abate, not aid, a public nuisance.

"The further consideration of this matter is not required of this application for a mandamus, but should be on an indictment and trial of the plaintiff for the violation of law so brazenly avowed by her."

ENGLISH TELEPHONE FACILITIES.

AN experiment, the issue of which will be watched with marked interest, is just now being conducted by the postal-telegraph authorities, reports Joseph G. Stephens, Consul, Plymouth, England. Its object is to ascertain how far it may be possible to make village post-offices serve the further purpose of public telephone-call offices. Six villages have been selected, and in these any one may now ring up a subscriber and communicate with him by telephone at the ordinary rates, which in this district amount to 12 cents for a three-minute conversation. If the person with whom communication is sought does not happen to be on the telephone list, the sender may telephone his message to the nearest post-office and have it delivered thence by express messenger. In the opposite direction—that is, from town to village—similar facilities will be available.

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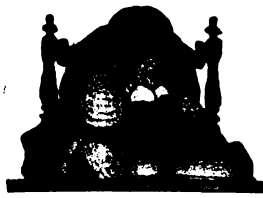
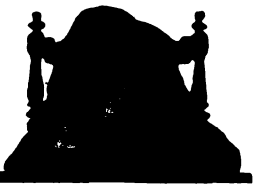


The Telephone in the Courts



Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

GRANT TO INCOMPLETE INCORPORATION.

The organization of our corporation was not complete, the articles of association being all drawn, signed and ready for filing but not yet forwarded to the Secretary of State, when our franchise was granted. Is our franchise good or not? G. R. T.

A GRANT to a company whose organization is not complete is not void, because the franchise, though not technically complete, is practically so. Chicago Telephone Company vs. N. W. Telephone Company, 199 Ill. 324.

TRANSFER OR FRANCHISE.

Can our company lawfully sell its franchise and will the purchaser get all the privileges we have? W. P.

THE Federal Courts all hold that any agreement by a company which is a common carrier, as a telephone company is held to be, to alienate and transfer the privileges granted it by the government is *ultra vires* and void. U. S. Union Pac. R. Company, 160 U. S. 1. Hatch vs. Amer. Union Telephone Company, 9 Abb. N. Cas. (N. Y.) 223.

The courts of Michigan and Wisconsin, however, have held the sale and transfer of a franchise by a telephone company to be valid, the court pointing out that if the right to sell a franchise does not exist, mortgages and bonds executed by the company are valueless. Michigan Telephone Company vs. St. Joseph, 121 Mich. 502. Badger Telephone Companys vs. Telephone Company, 97 N. W. 907. When a franchise is transferred the transferee takes the property subject to all the duties of the vendor. Mahan vs. Mich. Tel. Company, 93 N. W. 629.

CONDUIT UNDER SIDEWALK.

Can people who live along the main street of our city collect damages from us because we put a conduit to contain our wires under the sidewalk? A. Tel. Co.

A CONDUIT for wires laid under the sidewalk has been held by the Supreme Court of Indiana not to be an additional servitude upon the highway and therefore an abutting owner is not entitled to damages Coburn vs. New Teleph. Co., 156 Ind. 90.

SERVICE OF PAPERS OVER TELEPHONE.

IT has been held in York, Pa., that service of legal papers made by an officer over a telephone is null and void. A man was recently brought into court because he failed to appear as a witness in a surety of the peace case. The witness told the judge that he had been notified to appear by a constable who called him up over the telephone. The constable had handed in a bill for mileage in serving the subpœna. The court directed that the bill should not be paid and censured the officer. It would be rather hard for an officer to make oath to a service made by telephone.

JOINT LIABILITY.

AN employee of a fire-alarm company in the discharge of his duty and for the purpose of stretching a wire on a wooden pole belonging to a company, ascended the pole, and in so doing placed his foot upon an iron spike which was in contact with a feed wire of a traction company, and at the same came in contact with a guy wire of the latter company that supported one of its wire poles. He received a heavy current of electricity through his body which caused him to fall to the ground and receive injuries which resulted in his death. His administrator sued both the telephone company and the traction company, claiming that the death of the deceased was caused by the concurring negligence of the two companies and that they were jointly and severally liable for the loss sustained. The two companies insisted that they were improperly joined as defendants because the acts complained of were not joint, although they might be concurrent and related. They pointed out that the negligence of the traction company lay in not preventing an escape of the dangerous current of electricity which it was conveying through the street by its feed wire, and that its duties and liabilities were greater than those of the telephone company to see that its pole was not made dangerous.

The duties complained of against the traction company were its failure to properly insulate the feed wire, its failure to provide the guy wire with the circuit breaker, its failure to prevent contact of the guy wire with the pole of the telephone company and to prevent the displacement of the feed wire and its lodgment on the iron spike above mentioned. The omissions of duty on the part of the telephone company were alleged to be its failure to remove the feed wire from the iron spike and to prevent the contact of the guy wire with the wooden pole. The court held that the omissions of each were concurrent. It therefore decided that there was no misjoinder of parties. Graves vs. City Telegraph Association, 132 Fed. 387.

CHARGES AND COUNTERCHARGES.

A CHARGE of falsifying the city records of Chicago has been brought against Albert G. Wheeler, president of the Tunnel Company, by Edward J. Judd, formerly the attorney for Wheeler and the son of a former ambassador to Germany. Judd declares that acting on the instructions of Mr. Wheeler he paid $100 to City Clerk Ehrhorn for altering the city council proceedings, which were made to read that the city council had acted favorably on the ordinance permitting the telephone company to make alterations in its line and that this change was made by City Clerk Loefler. Wheeler, on the other hand, accused Judd with attempted blackmail and produced a letter purporting to have been written by Judd demanding money as the price of silence.

PROBATE COURT WITHOUT JURISDICTION.

THE recent decision of the Probate Court at Cincinnati, O., giving Independent telephone companies the right to lay conduits in the streets, has been reversed in the Common Pleas Court by Judge Littleford, who declared that the Probate Court could not grant such right if the city was opposed, unless the company owns and operates a telephone exchange, as provided in Section 3471 Revised Statutes.

"Such an exchange this company does not possess," Judge Littleford declared. "Therefore the Probate Court in the case of a disagreement between this company and the city can only direct a mode of use such as the two might have agreed upon.

"A reading of the statutes will show that the city and the company are not given the right to agree upon a mode of laying conduits, but only upon a mode of stringing overhead wires, and the fact that the statutes were passed before conduits were known to science explains the reason why they are provided for by the statutes. Placing wires in subways was first thought of about 1880, and was not put into use until some years later."

The Queen City Telephone Co.'s application has been made a test case to determine the rights of Independent telephone concerns to establish their system in Cincinnati. Three other Independent company applications are now pending in the courts.

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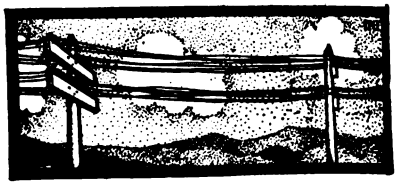
QUERIES

Questions on any subject relating to telephony will be answered on this page.



DEAD ENDING.—(471.)

Will you please illustrate and describe a good substantial method of dead ending wires on the last pole of a line. P. S.

As substantial and good a method as any is to use double arms on the last pole as by their use the liability of a line coming down from a broken arm is reduced to a minimum. This is especially important when the lead may have three, four, or five pairs. The method of dead ending under these conditions is illustrated in Fig. 471. Run the line wire to the insulator at *A* and make one turn; then run to insulator *B* on opposite side of glass

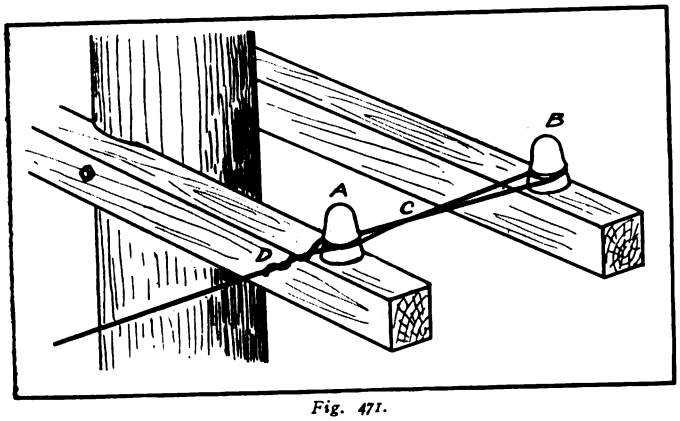


Fig. 471.

and make one turn. Now come back to *A* taking care to cross wire at *C* and make four or five turns on line wire at *D*.

CONDENSER CALCULATIONS.—(472.)

Will you kindly answer the following questions on your query, page 1. How is the value .000,00025 obtained in your recent article on condenser? 2. Why is the value 2π used in computing reactance due to inductance and capacity? S. M. O.

1. The capacity of a condenser same as shown in article of September 10 is given by formula $K = \frac{k\,s}{4\,\pi\,a}$ where

K = capacity in farads,
k = specific inductance capacity,
s = area in square cm.
d = thickness in cm.

Now let

A = area in square inches,
t = thickness in inches,
k = same as above.

Then

$s = A \times 6.452$,
$d = t \times 2.54$,

$$\therefore K = \frac{k \times A \times 6.452}{4 \times 3.1416 \times t} = .2021\ \frac{k\,A}{t}$$

and capacity in m. f. $= 000.000\,2021\ \frac{k\,A}{t}$

instead of .000.000225, as given.

II. In an alternating-current circuit having an inductance L, there is a self-induced E. M. F. set up, the magnitude of which is proportional to L, and the rate of change of current in the circuit. If this current (C) is flowing with a frequency of n cycles per second, the reactive E. M. F. will be $2\ n\ L\ C$ volts. L the co-efficient of self-induction, is the ratio of the number of lines linked with a circuit to the current producing them. ∴ it follows that the C. E. M. F. of self-induction $E = \frac{L\,d\,C}{d\,t}$

Now C is assumed as a sine function of time, having instant value value C, sin $2\ \pi\ n\ t$

Where C_1 = maximum value of C

$$\text{Diff.}\ \frac{d\ C}{d\ t} = 2\ \pi\ n\ C_1 \cos 2\ \pi\ n\ t$$

The virtual values of sine and cos. being equal gives value $E = 2\,\pi n\,L\,C = \omega\ L\,c$, but differing in phase with current by 90°

The value $2\ \pi n$ being the total angle (in radius) passed over by the current in one second, or one cycle is passed over in 2 π seconds. ∴ the angle passed over in any short time $t = 2\ \pi\ n\ t$.

RIGHT AND LEFT GUY.—(473.)

I have frequently heard the terms "right" and "left" guy. How is the right or left hand side of a pole line determined. C. N. L.

The right and left hand sides of a pole line are usually determined from its beginning; thus: A man standing at the point marked *A* in Fig. 473 and looking down the road from pole, one would naturally call all the guys on his right hand side "right" guys and *vice versa* for his left side.

RINGING ON LONG LINES.—(474.)

We have been operating 12, 4-bar, 1600-ohm bridging instruments on a line about 15 miles long. Telephones on last two miles of line ring very weak. Joints and insulation are all right. 1. Can we (by placing telephones of 2,000 or 2,500 ohms, resistance on the last two miles of line) obtain better results, and, if so placed, would they interfere with the 1600 ohm telephones on the rest of the line? 2. Do condensers help a line where only part of the line is equipped with them? R. T. A.

In reply to your first query: As we understand it, you have difficulty in ringing over the end of the long line, and desire to know whether ringing generators wound to 2,000 or 2,500 ohms placed at the end of the line upon which you experience the difficulty, will remedy the same. The trouble is probably due to the fact that your ringing generators are either insufficiently powerful to ring over so long a line, or else that the line is poorly insulated and the current leaks. The use of high-wound bells at

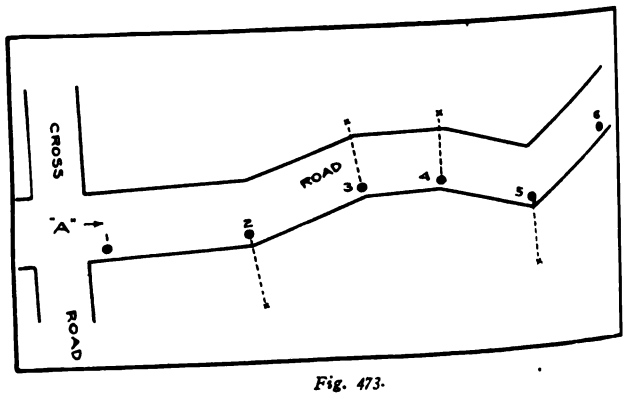


Fig. 473.

the end of the long line may improve matters, but you do not give us sufficient details as to the conditions to enable us to answer you definitely. We think your best plan would be to use a more powerful ringing generator at the exchange.

In reply to your second query: The condenser has nothing to do with the operation of the line at all. It is employed solely to prevent the flow of the battery through the line when the subscriber's receiver is on the hook in lines which are operated from common battery exchanges, and are placed in series with the receivers of magneto instruments to prevent the line being shunted by them when a receiver is off the hook and the line is being rung over.

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

EXCEPTIONAL offer—I have a three-fourths interest in a telephone stock company owning four good exchanges and 1,000 miles of toll and farmer lines. About 1,000 telephones in operation and sufficient territory for that many more. Stock outstanding amounts to $50,000. Has earned over 30 per cent. in past two years. No competition; $25,000 cash and balance long time; low rate. Address Box 291, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 291

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WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—Position as superintendent of a large exchange or manager of a plant, 1,000 telephones or less. Have had ten years' experience in all branches of the business. At present am superintendent of an exchange in a city of 175,000 population. Open January 1st to any company that wants a hustler. Address Box 286, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 286

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WANTED—Man experienced in underground conduit and cable work; office and outside workman who can run levels preferred. Give references and salary expected. Chance for advancement by large telephone company. Address Box 298, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 298

WANTED—Telephone salesman. One familiar with exchange material as well as interior systems. Address Box 299, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 299

WANTED—Telephone salesman who has had experience in handling intercommunicating and private branch exchange apparatus. Address Box 296, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 296

POSITION wanted by switchboard expert, with twelve years' experience. References given. Address Box 300, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 300

Cross-Arm Braces

PLAIN BLACK
JAPANNED
GALVANIZED

We are manufacturers and carry a complete assortment of all sizes in stock, and can make prompt shipments.

BUFFALO STEEL CO.

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The Hallett Iron Works,

96 W. Polk St., Chicago, Ill.

A SAFETY RING

SIMPLE

INEXPENSIVE

CAN'T CATCH SNOW

No wood to rot, and it can be put up between the arms without crossing the line wires.

MAY WE QUOTE PRICES?

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SOME NEW FEATURES IN SWITCHBOARD DESIGN.

THE telephone industry is one which has never stood still in its development. New ideas, new plans have been and are being constantly developed, which all lead to the ultimate perfection of the mechanical and electrical details of the apparatus. Although magneto switchboards have been in use for a great many years, and numberless improvements have been made since the first boards were manufactured, the subject has never been dropped and new ideas in their construction and operation are being presented continually. Almost every little change has been a forward step, but quite a leap toward simplicity of construction was made when the Monarch Telephone Mfg. Co., of Chicago, designed the self-restoring drop and jack illustrated on this page. One very noticeable characteristic of all Monarch apparatus is the simple ideas of construction and the ease with which any part of the whole can be removed or placed in a position for ready inspection.

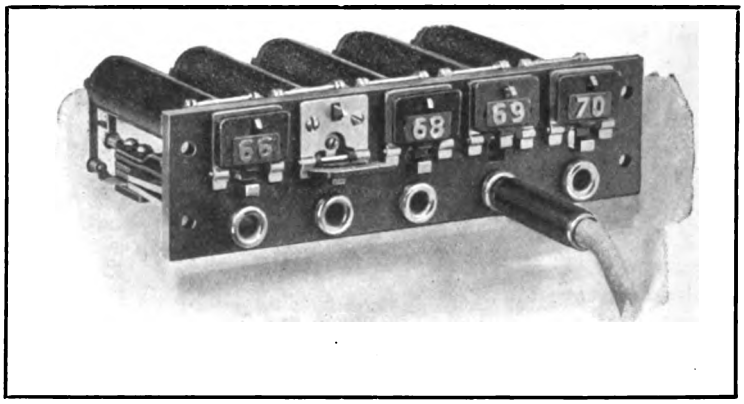

Fig. 1. Monarch Self-Restoring Drop and Jack, Showing Features of Mechanical Construction.

Practically all telephone men agree that the removable shelf feature of the Monarch compact telephone is an advantage, and undoubtedly the drop construction will meet with as universal approval. What exchange man has not had trouble removing a coil from a drop? The old method of construction made it necessary to entirely spoil the adjustment of the armature whenever a coil was taken out. The new method, as shown herewith, requires no such waste of time. By placing the armature on the front of the drop shell, the adjustment can be made permanent.

The coil is removed from the back of the shell, and therefore does not in any way change the armature adjustment. It will be seen that connectors extend from the jack springs to the drop coil. These connectors are slotted at the upper ends so that the slots may be fitted under the screws in the head of the coil. By loosening these screws the connectors can be turned down and the coil removed. The second cut shows this feature. In the head of the coil is a pin which fits into a right-angle groove in the shell so as to make a lock to securely hold the coil when in place. The coil terminals are soldered to small brass lugs, into which the connector screws fit. A first-class connection is thus secured, and there is no danger of breaking the fine wire which constitutes the coil winding.

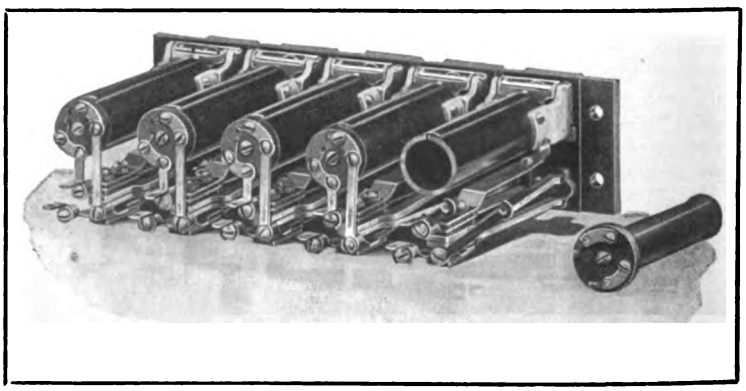

Fig. 2. Monarch Self-Restoring Drop and Jack, Showing Removable Features of Drop Coil and Mounting.

Another advantage of mounting the armature in front of the coil is the increased sensitiveness. The shutter hook is short, and a smaller amount of current will operate the drop than by the use of a long hook extending from the back of the coil. The leverage is greatly reduced, and therefore less power is required. This point is especially valuable for bridging drops on long and heavily loaded lines.

The armature is made of Norway iron, and is carefully annealed to obviate any trouble from residual magnetism. The coils are wound with silk-covered magnet wire to their marked resistance. As all parts are made from especially constructed tools and dies, a coil from any Monarch drop will exactly fit any other Monarch drop.

The jack construction shows a distinct departure from old ideas. The mounting for the springs is formed up from heavy brass strips which are riveted to a brass collar on the mounting plate. An extremely rigid mounting is thus secured. Another good feature is that there is no place for dust to accumulate. A spring is provided for both tip and sleeve contacts so the connections do not depend on the jack sleeve. Platinum contacts are used throughout, and the springs are of German silver. All insulators and bushings are hard rubber, and terminals are provided for either screw or soldered connections.

An extremely simple and positive restoring device is used. An extra spring having no electrical connections whatever with the rest of the jack is placed above the regular jack springs, and is fastened by means of a rubber insulated pin to the sleeve contact spring. The end of the restoring spring extends through the mounting plate and is bent upward in the form of a right angle. A plug being inserted in a jack, the tip of the plug passes the sleeve contact spring and raises it. This action also raises the restoring spring, and the end or angle part of the spring engages the drop shutter and restores it. The springs and other parts of the jack are made of sufficiently heavy stock to preclude any trouble from weak action. The action is just the opposite—quick and sure. The fact that the restoring spring is operated by the sleeve contact which, in turn, is raised by the tip of the plug, causes the drop to be restored before the plug is more than one-third of the way in. This takes the shutter out of the way of the operator's thumb.

The drops and jacks are entirely insulated from each other, and also from the mounting strip. It is therefore impossible to get any cross-talk, and improbable that a whole strip of drops will ever be burned out by lightning. In fact, the drops and jacks are separate units mounted on 1 3/16" centers on steel mounting strips 1¼" wide by 6¼" long. The front of the drop and jack

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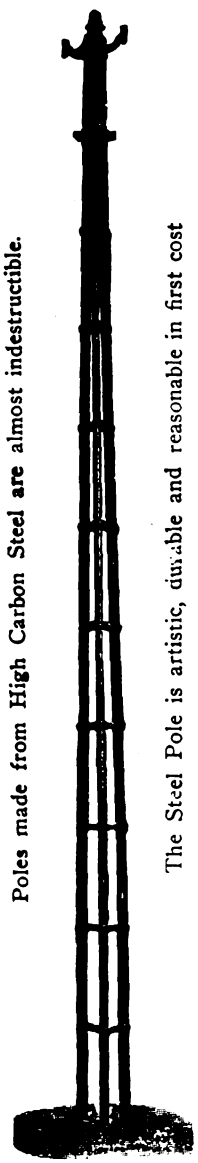
The Open-Wireless Telephone Plant

is an all-cable plant; that is, it has no open wire (bare wire) or cross arms, and when supported on steel poles

DEPRECIATION IS ALMOST ELIMINATED; MAINTENANCE REDUCED TO A MINIMUM



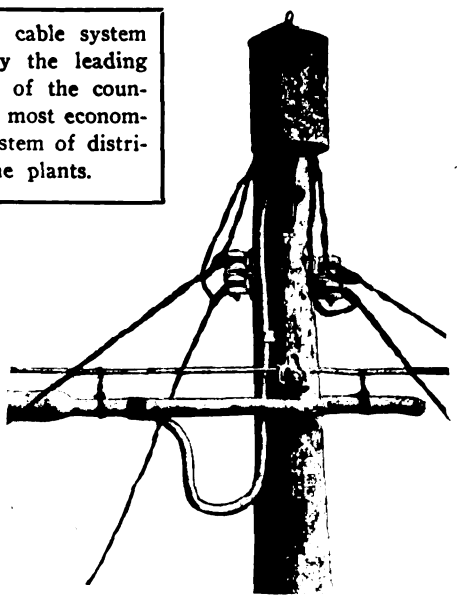
POLE OF THE FUTURE

Poles made from High Carbon Steel are almost indestructible.

The Steel Pole is artistic, durable and reasonable in first cost

No poles to rot.
No cross arms to rot.
No glass insulators to break.
No crossed wires to interfere with service.
Trees do not interfere.
Sleet storms lose their terror.
No unsightly cross arms and wires on the streets.
No bare wires to break and fall on electric light wire and kill someone passing by.

The multiple tap cable system is acknowledged by the leading telephone engineers of the country to be by far the most economical and durable system of distribution for telephone plants.



THE SYSTEM OF THE FUTURE

The undersigned is a pioneer in multiple cable distribution and makes a specialty of

Planning Cable Layouts
Multiple Cable Distribution
Equipping for Party Lines
Rate Raising, Etc., Etc.
Plans, Specifications and Supervision of Installation of Complete Telephone Plants

WILL GUARANTEE TO INCREASE THE DIVIDENDS IN 99 TELEPHONE PLANTS OUT OF EVERY 100

Engineering, constructing and putting plants on a dividend-paying basis a specialty.

There are many serious mistakes made in the selection of apparatus, construction and maintenance of telephone plants due to lack of experience.

There are many leak holes in a telephone plant unless properly watched.

With proper co-operation on part of owners of telephone plants I will guarantee to make any Telephone Plant pay dividends or increase your present earnings. Can refer you to a number of telephone plants where I have saved thousands of dollars in first cost of the plant, increased the earnings, improved the service, decreased the operating expenses by installing proper apparatus in the proper way and properly organizing the working force. Can furnish expert engineer, wire chief, auditor, solicitor, chief operator, each a specialist in his line.

LEROY W. STANTON

Consulting and Constructing Telephone Engineer

Branch Office
1644 Monadnock Block
Chicago, Ill.

Main Office
411 Electric Building
CLEVELAND, O.

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strip is neat and very sensible. The mounting plate is given a genuine Bauer-Barrf finish, which leaves it a dead black, which is much easier to the eye than a polished surface, and so far as lasting qualities are concerned it cannot be surpassed. The jack sleeves are nickel plated, but not polished. This makes it easier for an operator to distinguish each separate jack than by the use of glaring white jack sleeves.

The drop shutters are given a Bauer-Barff finish, and are equipped with raised number plates. The shutter hooks and drop faces are nickel plated, but not polished. The complete strip has a neat appearance, and is very satisfying to the eye. Durability has been considered before showiness, but nevertheless a handsome effect has been produced. Although the Monarch switchboard has been advertised very little up to this time, boards with an equipment of over 2,000 drops have been sold. The Monarch Company attributes this rather extraordinary success to two facts: The absolute confidence Monarch customers place in all products of the Monarch Company, and the substantial and simple construction of the apparatus.

Fig. 1. Bissell Pothead Sleeve.

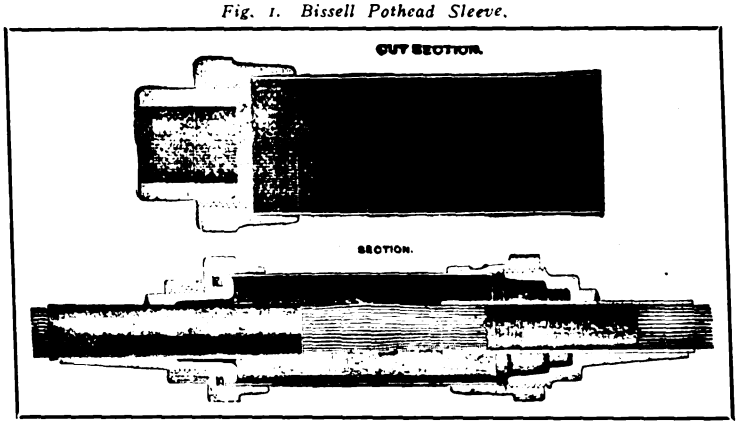

Fig. 2. Bissell Sleeve—Straight Away.

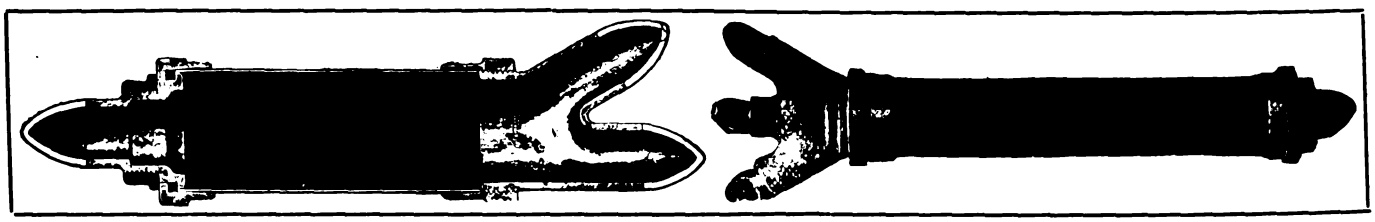

Fig. 3. Bissell Y Branch.

Fig. 4. Bissell Three-Way Branch.

NOVELTY IN POTHEADS AND CABLE SLEEVES.

LONG experience has proven the pothead to be the most efficient and most economical method of terminating cables. In the past it has always required particularly skilled labor to insure the pothead being made in such manner as to be absolutely water tight. This is necessary to preserve the insulation of the cable from subsequent deterioration.

THE F. BISSELL COMPANY, of Toledo, O., have a device on the market which is termed a slidable pothead. Its object is to make potheads more accurately, and with less probability of future deterioration of the cable. The general design of this invention is shown in Figure 1, from which it appears that the pothead consists of a sleeve which is soldered into one-half of a union. By means of a screw thread this sleeve engages the collar, which is secured by soldering to the cable. With this invention the operation of making a pothead is extremely simple.

In the first place, by means of a wrench the sleeve is unscrewed from the collar. It is then taken away and the lead is stripped from the cable for the proper distance. The collar, *K*, is next soldered by means of an ordinary soldering iron to the end of the lead sheath. The sleeve is then slipped over the cable and down beyond the collar. The cable wires are then fanned out and arranged in any desired manner. The sleeve is then returned to its position, and secured in place upon the collar. And finally the cable ends, after being arranged inside of the sleeve, are insulated by pouring the sleeve full of any desired cable compound, such as Chatterton's or any other make. This completes the pothead, which it is evident can be made with the exercise of but a small amount of skill. Figure 2 is an illustration of a soldering device, which is designed for the purpose of making splices in cables. A slight inspection of the figure shows that it is in principle similar to that of Figure 1, except that there are two collars, *A* and *B*, one of which is soldered on to the lead of one cable while the other is similarly attached to the lead of the other. The sleeve is unscrewed and slipped over the sheath of one cable, then the wires are fanned and spliced in the ordinary manner, and subsequently the sleeve is replaced upon the union and the joint filled with compound in the ordinary manner.

An arrangement is shown in Figures 3 and 4 whereby a Y splice may be made by means of the same device. They are self-

Fig. 5. Bissell Pothead Bracket.

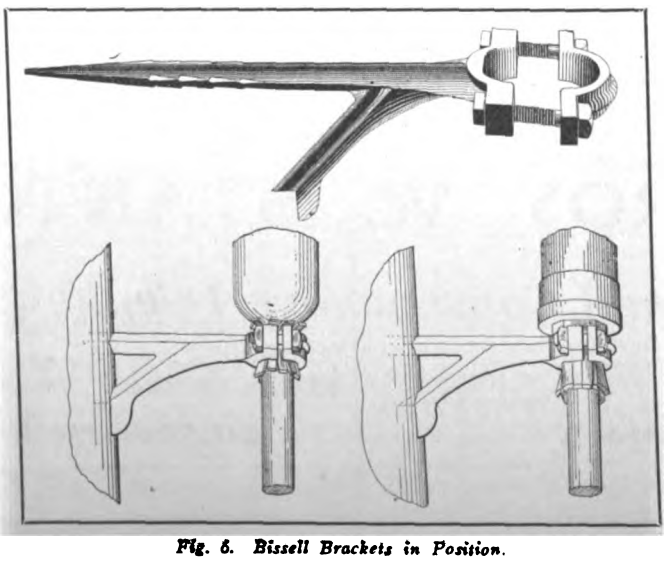

Fig. 6. Bissell Brackets in Position.

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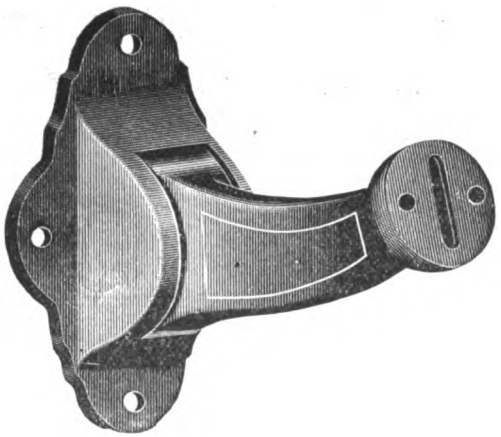
Baird Transmitter Arms



Look better.—*are* better than the present visible joint arm. No adjusting required, as the friction is permanent when arm is assembled. Three coats of enameling, and no handling after enameling, produces a fine finish. Ask for it on that new equipment you are ordering. Costs no more than the present type.

Illustrated circular and prices on application.

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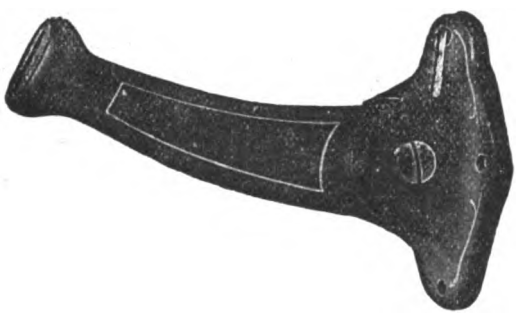

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For Twin or Parallel Wires. Price $4.30 per 1000.

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is better than

3 Dozen Staples,

2 Dozen Wooden Cleats, or

1 Dozen Porcelain Cleats,

The Morris Hard Fibre Cleats

LAST FOREVER

All others split, break or destroy the insulation of the wire.

Maintenance Cost of Morris Cleats, . 0 per cent.
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Style "C." (Exact Size)

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They are small, neat, labor saving, time saving, unbreakable, and solve all inside wiring problems. Every telephone man should use them. When ordering specify color: red, gray or black. Write for FREE SAMPLES.

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For Three Wires. Price $6.50 per 1000.

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Manufacturers of Fibre for . . Electrical Purposes . .

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explanatory. The ease and economy whereby cable work may be performed by means of this invention are self-evident, and while the devices themselves are somewhat more expensive than the materials ordinarily required in making potheads, they amply recoup themselves in the greater economy of labor. The F. Bissell Co. is also marketing some devices which are shown in Figures 5 and 6 for securing potheads in place either on the walls of buildings or to the poles or other appliance upon which the cables terminate. The method of using these is sufficiently obvious from the illustration to render further description unnecessary.

The company has just issued a leaflet describing these devices and also its "Security" paper insulators for cables, American wire joints, wrenches, cable compound, shave hooks for scraping lead sleeve, boxwood dresser for shaping lead sleeves, boxwood turn pin for expanding ends of lead sleeves, and a few of the many varieties of wires and cables it carries in stock. This circular is arranged in bulletin form, with holes punched for binding, and is known as Supplement No. 1 to Bulletin No. 33. A copy will be cheerfully mailed to anyone asking for it.

AN INEXPENSIVE TOLL TIME STAMP.

FOR some time operating telephone companies have been looking for a self-contained time stamp which is thoroughly reliable, and also one that prints a small, clear and easily readable record. Mr. Edw. P. Baird, realizing the field open for such a stamp, has invented and put upon the market the Baird Rapid-Lever Self-Contained Time Stamp. This stamp has won for itself many admirers among telephone operators. A glance at the illustration (Fig. 1) will show that the stamp is made in a very substantial way. Experience has proven that it will stand up under the most severe usage. Further than that, the operator has no trouble in reading the record, a sample of which is shown in Fig 2, made by the stamp at first glance. Then again, the stamp can be sunk into a switchboard, making it possible to handle toll tickets very rapidly.

Fig. 1. Baird Time Stamp.

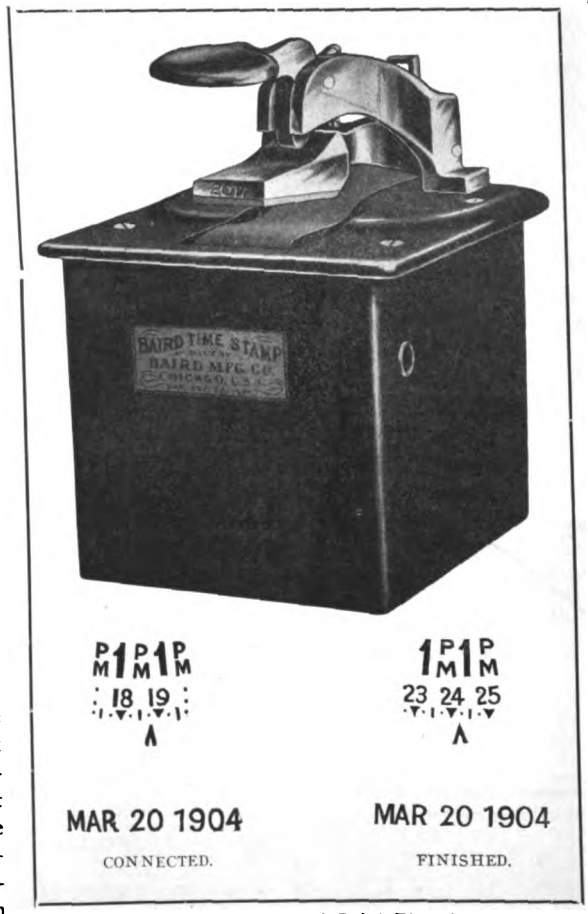

Fig. 2. Impressions of Baird Time Stamp.

The Seth Thomas Co. has made a special movement for use in this clock so the jar incident to making the record will not be imparted to the movement and put it out of order. The printing dials revolve on polished, case hardened bearings, and the construction is such that the force of the imprint does not reach the bearings. The automatic ribbon reel takes up ribbon at each action of the lever, so that the ribbon is not worn out quickly.

The Baird Time Stamp is guaranteed against all structural defects, and any part which proves defective will be replaced free of charge. The Baird Manufacturing Company, 4 Michigan street, would be pleased to answer any further questions regarding the stamp, and send descriptive literature on request.

NEW MANUFACTURING COMPANY.

THE newest concern in the market for supplying switchboards, telephones and telephone apparatus to the Independent trade is known as the KUSEL & KUSEL AUTOMATIC SWITCHBOARD & TELEPHONE MANUFACTURING COMPANY, with main offices in the Monadnock Building, Chicago, Ill. The company announces that it will make a specialty of Clark automatic and manual switchboard apparatus.

The principal stockholders in the new concern are Messrs. I. J. and H. J. Kusel, who have been associated with the Eureka Electric Company for the past eight years. They have severed their connection with the Eureka Company to establish the new concern. They are both well known in the Independent field.

A new catalogue and descriptive matter in bulletin form of the apparatus manufactured by the KUSEL & KUSEL AUTOMATIC SWITCHBOARD & TELEPHONE MANUFACTURING COMPANY will be issued in about ten days, and will be sent to any one interested.

THE KNOX-DICKEY TELEPHONE MANUFACTURING CO., Portsmouth, O., has recently entered the market with a selective party system that has a number of points of interest worthy of the investigation of all exchange managers. A very valuable feature of the devise is that it operates irrespective of frequency or voltage, thus allowing any type of hand or machine generator to be used. The mechanical details have been reduced to the simplest possible point eliminating brased springs and other devices used to determine the signals of the bells. By the aid of an auxiliary battery of about sixty cells, thirty for each side of the line, selective signaling for four parties can be accomplished. There are no relays to get out of adjustment. Bells are rung with alternating current and do not chatter, and the simplicity of the system is such as to enable it to be easily understood by any parties at all acquainted with telephone operation.

THE CENTURY TELEPHONE CONSTRUCTION CO., of Buffalo, N. Y., is completing the construction of the long-distance line from Buffalo to Jamestown, N. Y., for the Inter-Ocean Telephone and Telegraph Company. The line is a standard trunk line with full copper metallic circuits.

MORGAN AND WRIGHT, Chicago, wish to draw the attention of the telephone trade to its tape. Tape is one of the most essential adjuncts to a telephone system, and consequently it should be of the best possible manufacture, as quite often the operation of a line depends upon it. The Morgan and Wright tape possesses all the advantages of other grades in a superlative quality. From an insulation standpoint it is very high in resistance and besides is very uniform. It will not dry out and possesses exceptional adhesive qualities. Samples and prices for the asking.

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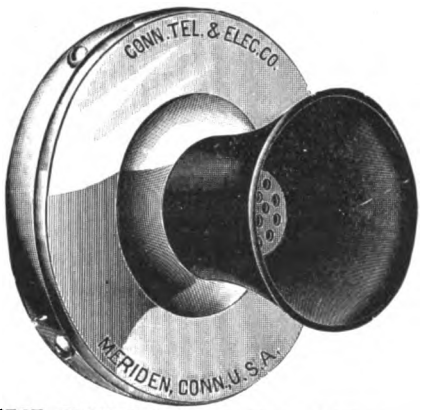

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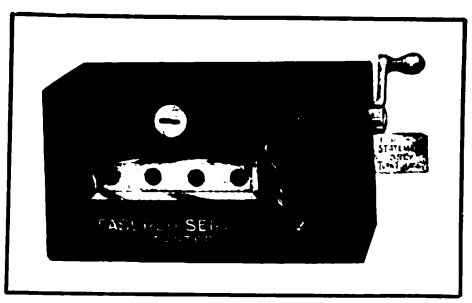

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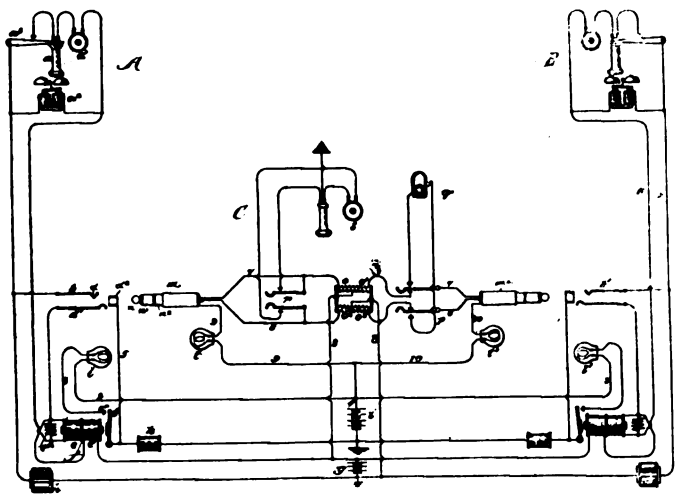
TELEPHONE PATENTS

COMMON BATTERY SWITCHBOARD CIRCUIT.

F. R. McBerty, of Evanston, Ill., patents (No. 774,332) and assigns to the Western Electric Co., of Chicago, Ill., an improved common battery switchboard circuit. The object of this invention is to provide an improved circuit for common battery switchboards, and is an improvement upon a former patent (No. 680,879) granted to the same inventor. The operation of this system is as follows:

When the subscriber *A* removes the receiver, circuit is closed from battery *g* through windings *e'* and *e* of the relay *f*, thence



over the line conductors *1* and *2* and through the impedance coil *h* back to battery. The relay is excited and closes the local circuit through the conductor *4*, resistance coil *k*, contacts *e'* and *e3* of relay lamp *1* and conductor *3* to battery. The insertion of plug *m* into the jack *b* provides a low resistance path through the windings *o* and *o2* of the repeating coil, and the winding *o* becomes a shunt about the coil *e'* of the relay. Also branch *9*, containing the supervisory lamp *t*, is closed and becomes a shunt to the local circuit *3 4*, including the line lamp *1* and the resistance coil *k*. Hence the insertion of the plug extinguishes the line lamp, while at the same time the supervisory lamp remains unlighted. The operator takes the order in the usual manner with the listening key *r* and rings the called subscriber with the key *p*. When the connecting plug *m'* is inserted in the jack *b'* of the called subscriber, the circuits are similar to the ones already traced, but since the relay of the line is not excited, conductor *3* is interrupted, signal lamp *1'* is dark, while the supervisory lamp *t'* is lighted. When the subscriber removes the receiver the relay is excited, closes conductor *3* and extinguishes signal *t'*. When either or both receivers are replaced the corresponding relay becomes inert and the entire current is diverted through the corresponding signal.

IMPROVED SUPPORT FOR TELEPHONE RECEIVERS.

F. W. St. John, of Coshocton, Ohio, patents (No. 771,946) an improved support for telephone receivers. The inventor provides an arm upon one end of which the receiver is attached by means of a spring fork. This arm is pivoted so that it may be rotated in a vertical plane and thus adjusting the ear of the person using the instrument.

PARTY LINE TELEPHONE SYSTEM.

William R. Whitehorne, of Bethlehem, Pa., patents (No. 775,201) party line telephone system. The object of this is to provide a party line telephone system so that the central office can call any subscriber without signaling any other one, and that the ringing of the bell may be accomplished simply by the inserting of the plug, without any further action on the part of the operator. The circuit is shown in Fig. 1 and substation apparatus in Fig. 2.

The chief feature of the invention is the employment of differential magnets at the substation. If the subscriber, say *D*, removes his receiver from hook *14*, and hook will rise, carrying bar *2* causing arm *15* to be interposed between armature *16* and magnet *a*, opening the circuit of main line *A*. Immediately afterwards switch *m* is momentarily closed and then opened by hook *14*, thus momentarily connecting the local battery *f* across the mains *A* and *C*, energizing the circuit breaker *j*. The winding of this circuit breaker and the connection of the battery *f* are such that armature j^2 is attracted, releasing the *j'* signal, and also opening the switch of which *j'* is a part, and opening the short circuits of the mains *A* and *C*. This movement can also display the busy signal. The end of hook *14* connects the terminals of switch *3* to complete circuit of transmitter *9*, and permits bar *2* to engage wth terminal *17*, completing the circuit of receiver to main *A*. The operator plugs in, sending current from battery *n* through main *C* to ground.

As all of the windings of a^3 are in series with each other and the main *C*, all the magnets *a*, *a'*, a^2, etc., are energized, and all, with the exception of *a*, attract their armatures; *a's* armature cannot move because of the interposition of arm *15* between its arm and core. Where any armature is moved, the signal *6* is operated by local battery *f*, bar *1* being moved to contact with terminal *18*. Resistances *K*, K^3 and K^4 are so proportioned to the windings on the magnets *a*, *a'*, etc., that the current from

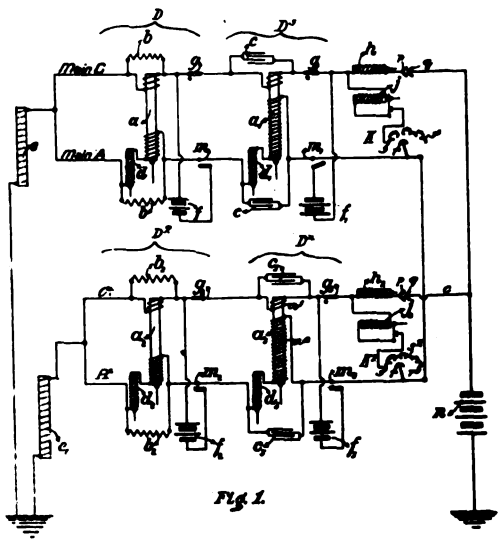


Fig. 1.

n divides between the mains *A'* and *C'* so that the field produced by one of the windings on the magnet a^2 or a^4 will neutralize that produced by the second winding upon the said magnet; but since the ratio of the windings upon a^2 is different from that of a^3, the armature of the magnet will move. The current through *A'* will energize the bell controlling magnets *d*, and will close the switches *8*. The closing of said switches will have no effect except on the instrument it is desired to call, namely a^3, since the armature *16* is the only one that is in such a position as to complete the local circuit of battery *f* to bell *B* bar *1*, consequently bell *B* is rung continuously until the receiver is removed.

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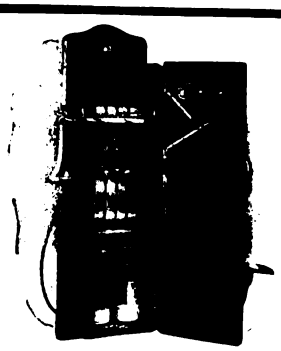

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THE WEEK'S MESSAGES

FINANCIAL.

BRAYVILLE, ILL.—Mr. W. E. Westfall, manager of the Independent Telephone System, is arranging to organize a stock company with a cash capital of $4,000, and to erect a modern city exchange.

EDMORE, O.—At the annual meeting of the Ottawa County Telephone Co., the usual dividend of 3½ per cent. was declared.

CLEVELAND, O.—The October statement of earnings of the United States Telephone Co. shows an increase, gross, of 6 per cent and a net increase of 9.6 per cent. over the similar period last year.

NORTHFIELD, VT.—At a recent meeting of the Northfield Telephone Co. a reorganization of the company's stock was effected, and it is reported that about 2,200 shares will be issued.

GREEN BAY, WIS.—The Valley Telephone and Telegraph Co., of Green Bay, have increased their capital stock from $200,000 to $250,000.

FRANCHISES.

FRESNO, CAL.—The Home Telephone & Telegraph Co. will apply to the City Council for a franchise.

BICKNELL, IND.—The county commissioners have granted a franchise to a new telephone organization covering the right to use the highways of Vigo, Widner and Washington townships for erecting poles and stringing wires.

EVANSVILLE, IND.—The District Telephone Co. has asked the board of public works for permission to erect a new pole line two miles in length.

PARKERSBURG, IA.—The Farmers' Mutual Telephone Co. has started a petition for a franchise in this village.

ERSKINE, MINN.—A. F. Cronquist, J. A. Lang and E. E. Payne have been granted a twenty-year franchise by the city council.

NEW ULM, MINN.—The Blue Earth Telephone Co. has been granted a franchise for ten years, for which it will pay $1,500.

NEW COMPANY NOTES.

OZARK, ARK.—The Western Telephone Co., of Ozark, has been incorporated with a capital stock of $100,000 to operate, buy and sell telephone systems. L. F. Maxey, treasurer; W. H. Fulker, L. D. Huggins and others directors.

LOS ANGELES, CAL.—The Richardson Construction Co. has been organized with a capital stock of $500,000 for the purpose of undertaking telephone construction in various parts of Mexico. The principal organizers are: Davis Richardson and L. R. Richardson, of this city.

ELBERT, COLO.—The Elbert Mutual Telephone Co. has been incorporated with the following officers: President, C. A. Whittier; vice-president, R. Larson; treasurer, H. D. Duvall; secretary, Mrs. M. E. Merriam; manager, W. S. Epler.

CLINTON, IA.—The Tri-City Telephone Co. (sometimes erroneously called the Twin-City) has been incorporated with a capital stock of $600,000 and bonds $400,000. This company operates exchanges in Clinton and Lyons, Iowa; and Fulton, Ill. The officers are: President, and general manager, Allen G. Hawley, Clinton, Ill.; vice-president, D. F. Higgins; secretary and treasurer, C. B. Cheadle, of Joliet, Ill.

HASKELL, I. T.—The Haskell Telephone Co. has been incorporated with a capital stock of $10,000. The incorporators are J. C. Scully and C. E. Henson, of Haskell, I. T.; W. J. Criswell, of Wileyville, W. Va.; and George S. Whidden and Earl G. Hopkins, of Boynton, I. T.

LOUISVILLE, KY.—The Kenyon Construction Co., with offices at 405 Urban Building, Louisville, has been incrporated to build and operate telephone exchanges in Kentucky and adjoining States.

MEDFORD, MINN.—The Straight River Telephone Co. has been organized among business men at Medford, who will open an exchange at that place and connect with the Northwestern. The line will be about eight miles long.

WOOD LAKE, MINN.—The Wood Lake Rural Telephone Co. has been incorporated with a capital of $30,000 by J. W. Griffith and others.

AUBURN, MISS.—The Auburn Telephone Co. has been incorporated with a capital stock of 35,000 by B. H. Ramsey, E. R. Conklin and F. W. Kelly.

BELLEVILLE, MO.—The Rural Telephone & Telegraph Co. has been incorporated with a capital stock of $2,500 by L. D. Turner, A. Hinke and G. W. Detharding.

NEW YORK, N. Y.—The Interborough Telephone & Telegraph Co. will be incorporated with a capital stock of $100,000 to construct long distance lines between Philadelphia and New York and Montreal and New York. The directors are H. S. Gould, Charles A. McCready, of New York, and others.

RINARD MILLS, O.—The Pryor-Bode Telephone Co. has been incorporated with a capital stock of $5,000 by J. H. Pryor, M. Bever, G. A. Bodea and others.

PIERRE, S. D.—The South Dakota Telephone Co. has been incorproated with a capital stock of $100,000. The incorporators are: A. Ewart, E. P. Farr and W. S. Rowe, of Pierre; and G. E. Sumner and C. L. Millette, of Fort Pierre.

EGLON, W. VA.—The Eglon Mutual Telephone Co. has been incorporated with a capital stock of $5,000.

HARDY, W. VA.—The Hardy Mutual Telephone Co., of Hardy, W. Va., has been incorporated with a capital stock of $5,000 to operate a telephone system in various towns along the public roads of the State. The incorporators are J. H. Park, A. D. Walker, R. J. Wilkins and J. W. F. Combs of Needmore; and B. E. Brill, of Fabins.

COMBINATIONS.

MONROE, GA.—The Monroe Telephone Co. will consolidate with the Monroe Telephone Exchange Co., the Walton Telephone & Telegraph Co., and the Monroe and Campton Telephone & Telegraph Co.

BLOUNTSVILLE, IND.—The Cambridge City Telephone Co. has bought the plant of the Blountsville Telephone Co. Mr. Lamb is president of the new company.

BLUE RAPIDS, KAN.—The Greenleaf Telephone Co. has been sold to the Blue Rapids Telephone Co. for $12,200.

EDMONTON, MANITOBA.—The city council has purchased the Edmonton District Telephone Co.'s line for $17,000.

FALL RIVER, MASS.—It is reported that a controlling interest in the Fall River Automatic Telephone Co. has been purchased by John T. Swift and others. The officers of the company are: E. B. Jennings, president; B. D. Davol, treasurer; and E. B. Jennings, B. D. Davol, Quinlan Leary, R. F. Haffenreefer Jr., M. Feeney, A. P. Mathewson, Dr. R. J. Thompson, M. Sweeney and Vinton A. Sears, of Boston, directors.

ST. PETER, MINN.—The stockholders of the Nicolett County Telephone & Telegraph Co. have voted to purchase the St. Peter Telephone system from James Bennett for $35,000. The deal will be closed on December 15th.

FREMONT, NEB.—The Trumbull Exchange is to become a part of the Hamilton County Farmers' Telephone Association on December 1, 1904.

NEW ROCKFORD, N. D.—Henry Wilson, of Wimbledon, has closed a deal whereby he now owns the telephone exchange at this place.

ELECTIONS.

MORO, ILL.—The Moro telephone line No. 1, at its annual meeting, elected Z. E. Bivens, president; John Unterbrink, vice-president; Smith Dorsey, secretary; F. C. Zoelzer, treasurer; C. E. Cooper, electrician; W. D. Kuethe, director.

ST. JOSEPH, ILL.—The following officers have been elected by the recently incorporated St. Joseph Telephone Co.: President, O. C. Boggs; vice-president, T. J. Wardin; treasurer, N. G. Glascarth; manager, J. O. Henderson.

CONCORD, IA.—G. W. Mason, of Kanawha, has been elected president of the Hancock County Rural Telephone Co. to succeed E. C. Abbey.

WINDSOR, ONT.—The Ontario Independent Telephone Co., at a recent meeting, organized with the following officers: President, John H. Connelly; vice-president, James H. McRae; treasurer, F. J. Lawrence; secretary, A. D. Prosser; general manager, C. W. Taylor; assistant general manager, P. T. Shesley. The directorate consists of the foregoing officers and J. R. Brooks and Mayor Brault, of Amherstburg. The company will install an automatic exchange system and will commence work immediately on its lines throughout Essex county, beginning at Amherstburg. Over 400 subscribers have already been secured.

MISCELLANEOUS.

HUNTSVILLE, ALA.—Another co-operative telephone company is being formed by Madison county farmers and the proposed system is planned to connect Wooley Springs, Jeff, Cluttsville and other communities in the nohthwestern part of the county with the Huntsville exchange.

MILFORD, IND.—The Royal Telephone Co. has recently bought two new switchboards for its exchange in this city.

NEWCASTLE, IND.—The Independent Telephone Co. recently sustained a loss by fire of $2,000 in cables.

DES MOINES, IA.—The Mutual Telephone Co. expects to move into its new exchange in the near future.

ASHLAND, NEB.—H. H. Herndon, of the Ashland Telephone Co., has sold his stock to H. A. and E. A. Wiggenhorn, Jr., and C. H. Folsom. The latter will succeed Mr. Herndon as president and general manager.

COLUMBUS, O.—The Montgomery County Telephone Co. is soliciting stock to operate the exchanges in Dayton and a number of neighboring towns.

COLUMBUS, O.—The executive committee of the Ohio Independent Telephone Association met here recently to devise plans for a more compact organization of the independent telephone companies of the State. Those present at the meeting were: J. B. Hoge, of Cleveland; Dwight E.

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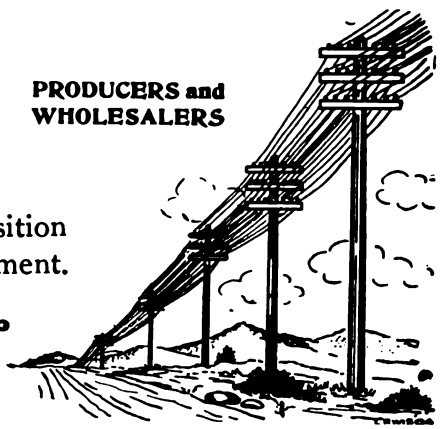

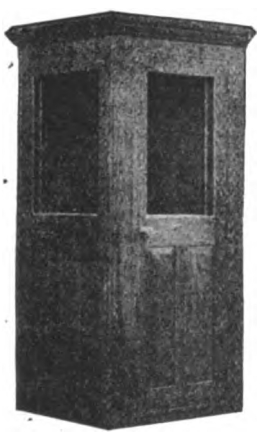

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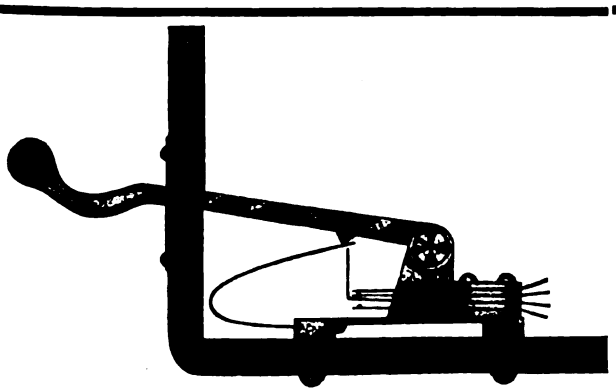

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Sapp, of Mt. Vernon; E. L. Barber, of Toledo; and Cyrus Huling and Frank L. Beam, of Columbus.

HOLLIDAYSBURG, PA.—A farmers' telephone company, with a capital of $10,000, is being organized at this point.

MONTROSE, PA.—The Montrose Telephone & Telegraph Co. has its Tunkhannock line with the Tunkhannock & Wyoming Valley Telephone Co. completed, and is now able to give service to distant points, such as Scranton, Wilkesbarre, Philadelphia, Towanda, Elmira, etc., with their intermediate points and connections.

SPRINGFIELD, VT.—The Springfield Local Telephone Co. now has 200 subscribers and is constantly growing.

UNDERGROUND.

CITY OF MEXICO, MEX.—It is expected that the Mexican Government will soon act on the plans submitted by the Mexican Telephone Co. for the placing of its wires underground, in the central portions of the city.

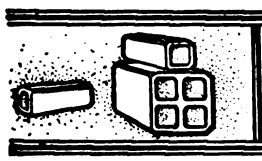
PERSONAL.

H. C. FUHE has been appointed assistant superintendent of the Ohio Valley Telephone Co., at Bellaire, W. Va.

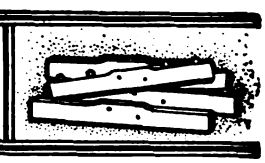
A. J. KENEDY has been appointed supervising engineer for the Fulton Telephone Co., at Fulton, N. Y.

D. H. MULLENIX has been appointed to an important position in the traffic department of the Southern Bell Telephone Co., at Atlanta, Ga.

F. R. WAKEFIELD has been appointed manager for the Michigan State Telephone Co., at Lapeer.



New Construction in the Field



CANTON, ILL.—The Canton Home Telephone Co. will commence the construction of a line to Fiatt as soon as the material can be placed upon the ground. Connection will be made at Fiatt with lines running to all parts of the county, and also to the principal cities in the adjoining counties, such as Galesburg, Peoria, Havana and other places.

PORTLAND, IND.—The Home Telephone Co. is extending its system of rural lines.

CONVERSE, IND.—The Converse Telephone Co. is busy erecting a new cable line.

PRINCETON, IND.—The Independent telephone company has made arrangements to build a new exchange in this city next spring.

HUDSON, IA.—The Hudson Mutual Telephone Co. is constructing a new line south of this town.

TOPEKA, KAN.—The Independent Telephone Co. of this city is contemplating extensive improvements.

LIBERTY, ME.—The China Telephone Co. will extend its lines to Liberty and Coopers' Mills.

SKOWHEGAN, ME.—The Farmers' Co-operative Telephone Co. is building its lines into the eastern part of this village.

ELKTON, MD.—The Diamond State Telephone Co. has reconstructed its lines between this point and Cherry Hill.

YUCATAN, MEX.—All the telephone lines in the State of Yucatan are to be thoroughly repaired.

ONTONAGON, MICH.—A project is on foot for the construction of a telephone line connecting this place on the north side of the county. It is proposed to build a line from Ontonagon to the Norwich mine, and thence to Matchwood, Bergland, Ewen, Bruces' Crossing and Trout Creek. The distance involved is between forty and fifty miles and it is figured that the line could be built for about $2,000. The Ontonagon County Telephone Co. connects the principal towns in this vicinity and some working agreement could be made with which to handle messages from the newly connected towns and villages.

DULUTH, MINN.—The Mesaba Telephone Co. is building a new line which will carry eighteen wires. Forty-foot poles are being used.

FOSSTON, MINN.—Fosston's local telephone system has completed a new branch line from this point to Winger, a town on the new Soo line southwest of here.

HENDERSON, MINN.—The Henderson Telephone Co. is building a new line to Green Isle.

SACRED HEART, MINN.—Carl Anderson will install a local telephone exchange.

SHAKOPEE, MINN.—Work on the Eden Prairie and Bloomington country lines is rapidly nearing completion.

VESTA, MINN.—The Rural Telephone Co. intend to extend their line from Seaforth to this place.

WRIGHTSTOWN, MINN.—The H. & W. Telephone Co. are rebuilding the line into Parkers Prairie.

MISSOULA, MONT.—The Big Blackfoot Telephone Co. has completed a line from Drummond to Orando via Helmville.

SEWARD, NEB.—The Lincoln Independent Telephone Co. will extend two copper circuits from this village to Lincoln.

FULTON, N. Y.—The Fulton Telephone Co. has decided to enlarge and improve its present system in this city to meet increasing demands by installing a new line of cables throughout, new and larger switchboard, new automatic telephones and many other minor changes.

NEW YORK, N. Y.—The Lehigh Valley Railroad is building a telephone system along its lines. A circuit has been constructed to Wilkesbarre and will be continued to Sayre.

UNION, O.—The Putnam Telephone Co. has constructed a farmers' line on the road between Sugar Creek and Union townships, connecting with the main line at Columbus Grove.

UTICA, O.—The Utica-Homer Telephone Co. and the Newark Company are jointly constructing an additional circuit from Utica to Newark, to avoid the delays in toll business that now occur by the lines being busy.

MANGUM, OKLA.—The Willow Telephone Co. is enlarging its system. They expect eventually to extend their line to Delhi and connect with the independent line there.

OKLAHOMA, OKLA.—The Pioneer Telephone Co. will shortly extend its lines to Muskogee and other points in the Territory.

BENTLEYVILLE, PA.—The Maple Creek Telephone Co. will build a line into this village.

EUGENE, ORE.—Wires for the Eugene-Florence telephone line have been strung between Eugene and Elmira, a distance of fifteen miles. The remaining sixty-five miles will be strung as soon as the work of setting the poles is completed.

BIRDSBORO, PA.—The Conestoga Telegraph & Telephone Co. are vigorously prosecuting the work of erecting poles and wires throughout this town.

DUBOIS, PA.—The Summerville Telephotne Co. will reconstruct its system and build additional lines in the near future.

WELLSBORO, PA.—The Citizens' Mutual Telephone Co. is building a line from Tioga to connect at Painter Run with its line to Elmira and Mansfield.

WILKES-BARRE, PA.—The Peoples Telephone Co. expects to extend its system in the near future, and to erect some table lines.

CONSTRCTION.

BEAUFORT, S. C.—The Peoples Telephone Co. have commenced the extension of their system to Yemassee. They expect to complete the work by January 1st, after which they contemplate further extensions.

BONESTEEL, S. D.—A telephone line is to be extended from St. Elmo to Herrick and also to Burke and Gregory.

RAMSEY, S. D.—A telephone line is being extended from Ramsey to Clarno.

SALEM, S. D.—The Salem Telephone Co. will begin the construction of rural lines at once.

LOCKHART, TEX.—The Smithville Telephone Co. is making extensions to its local system.

ORWELL, VT.—The Co-operative Telephone Company will extend its lines to Shoreham and later connect with the Peoples lines at Brandon.

WHITE RIVER, VT.—The Peoples Telephone Co., it is reported, are making extensive improvements.

SISTERSVILLE, W. VA.—The West Virginia Telephone Co. will construct new circuits to connect this town to Parkersburg and will erect a cable over the Ohio river at Matamoras.

A TELEPHONE AIDS AT A WRECK.

PRACTICAL illustration of the sometimes urgent need for telephone facilities was recently given in Columbus, Ind. A train wreck occurred on the Pennsylvania lines one afternoon. It happened that at the moment the disaster occurred an interurban car on the lines of the Indianapolis, Columbus and Southern Traction Company, which parallels the railroad at that point, was passing.

The traction conductor asked the motorman to put on all power and, hurrying to the nearest telephone box, he notified Joseph I. and William G. Irwin, of this city, owners of the Indianapolis, Columbus and Southern Traction Company, who immediately summoned all the physicians in town and sent a special car at top speed to the scene of the collision with Drs. B. Fitzpatrick, G. T. McCoy, W. H. Butler, D. J. Marshall and E. U. Wood. Shortly after their arrival the remainder of the physicians of the city were on the scene, having gone out in a second special car within a few minutes after the first one left.

A REMARKABLE MACHINE?

THE following news item taken from a Southern newspaper may prove of interest to some of our readers, as illustrating a new field for the usages of storage batteries and charging: "The local exchange of the East Tennessee Telephone Company has recently installed an expensive new apparatus which will improve the service, and enable the exchange to extend its business. The machinery consists of a new Holtzer-Cabot charging machine of two and one-half horse-power of 160 amperes, and new storage batteries, and by it an operator at the exchange can tell within a few yards of where a wire difficulty lies."

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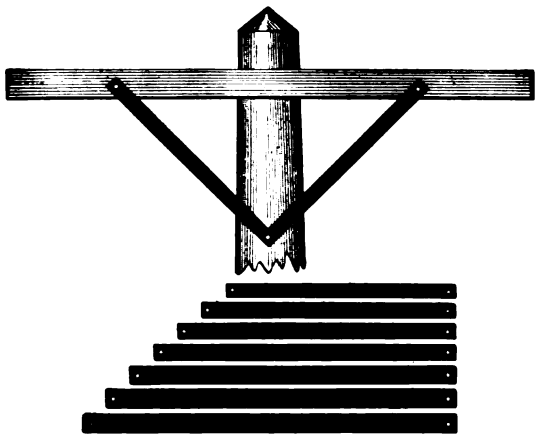

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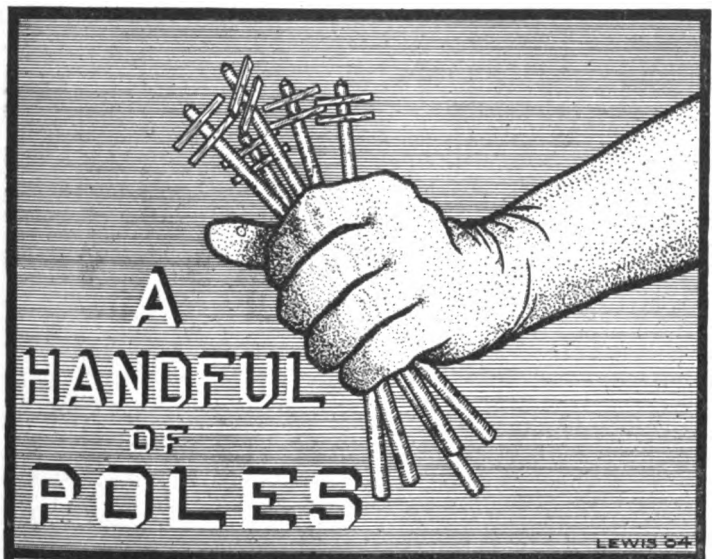

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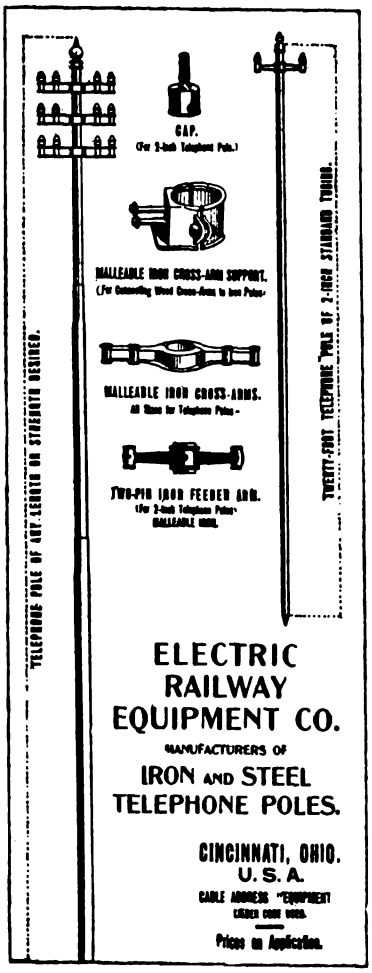

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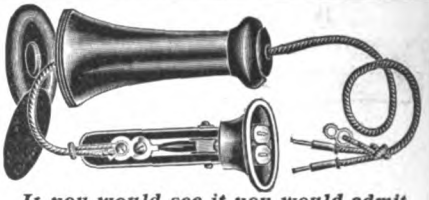

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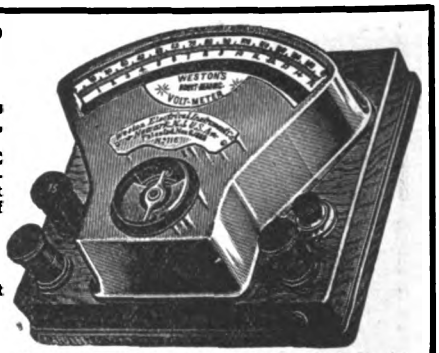

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Runzel-Lenz Mfg. Co.

SWITCHBOARDS.
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Century Telephone Const. Co.
Conn. Tel. & Electric Co.
Eastern Tel. & Mfg. Co.
Ericsson Telephone Co.
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Kellogg Switchboard & Supply Co.
Monarch Tel. Mfg. Co.
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Electric Appliance Co.
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Farr Tel. & Const. Supply Co.
Guarantee Tel. & Equipment Co.
Hipwell Mfg. Co.
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Kellogg Switchboard & Supply Co.
Monarch Tel. Mfg. Co.
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Spies Electric Co.
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Telephone Printing Co.

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TELEPHONE HOLDER.
Chicago Writing Machine Co.

TELEPHONE SUPPLIES.
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Baird Mfg. Co.
Barr, W. J., Mfg. Co.
Bissell Co., The F.
Century Telephone Const. Co.
Chicago Writing Machine Co.
Conn. Tel. & Electric Co.
Couch, S. H., Co.
Eastern Tel. Mfg. Co.
Electric Appliance Co.
Ericsson Telephone Co.
Farr Tel. & Const. Supply Co.
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Hipwell Mfg. Co.
Hubbard & Co.
International Telephone Mfg. Co.
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National Wire Corporation.
Okonite Co.
Roebling's, John A., Sons Co.
Runzel-Lenz Elec. Mfg. Co.
Standard Underground Cable Co.

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Telephone Wire

Every bundle of Wire bearing tin tags and lead seals as shown by these photographs is

Guaranteed the Best

and will invariably pass the specifications of the largest telegraph and telephone companies.

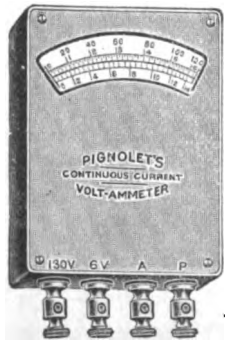
The National Wire Corporation

General Offices: Engineering Building, 114 & 116 Liberty St., NEW YORK.

Works: NEW HAVEN, Conn.

Sales Offices and Warehouses: New York, Chicago, Boston, Dekalb, Kansas City, New Haven, San Francisco

You Will Find It Pays To Test



your lines periodically for insulation and resistance. This can be best done with a Volt Ammeter. Mine are especially designed for this branch of telephone work and are low in price.

LOUIS M. PIGNOLET

Originator of the Voltmeter Habit. **78 CORTLANDT ST., NEW YORK**

Insulated Electrical Wires and Cables

Bare Steel and Copper Telephone Wire

John A. Roebling's Sons Co.

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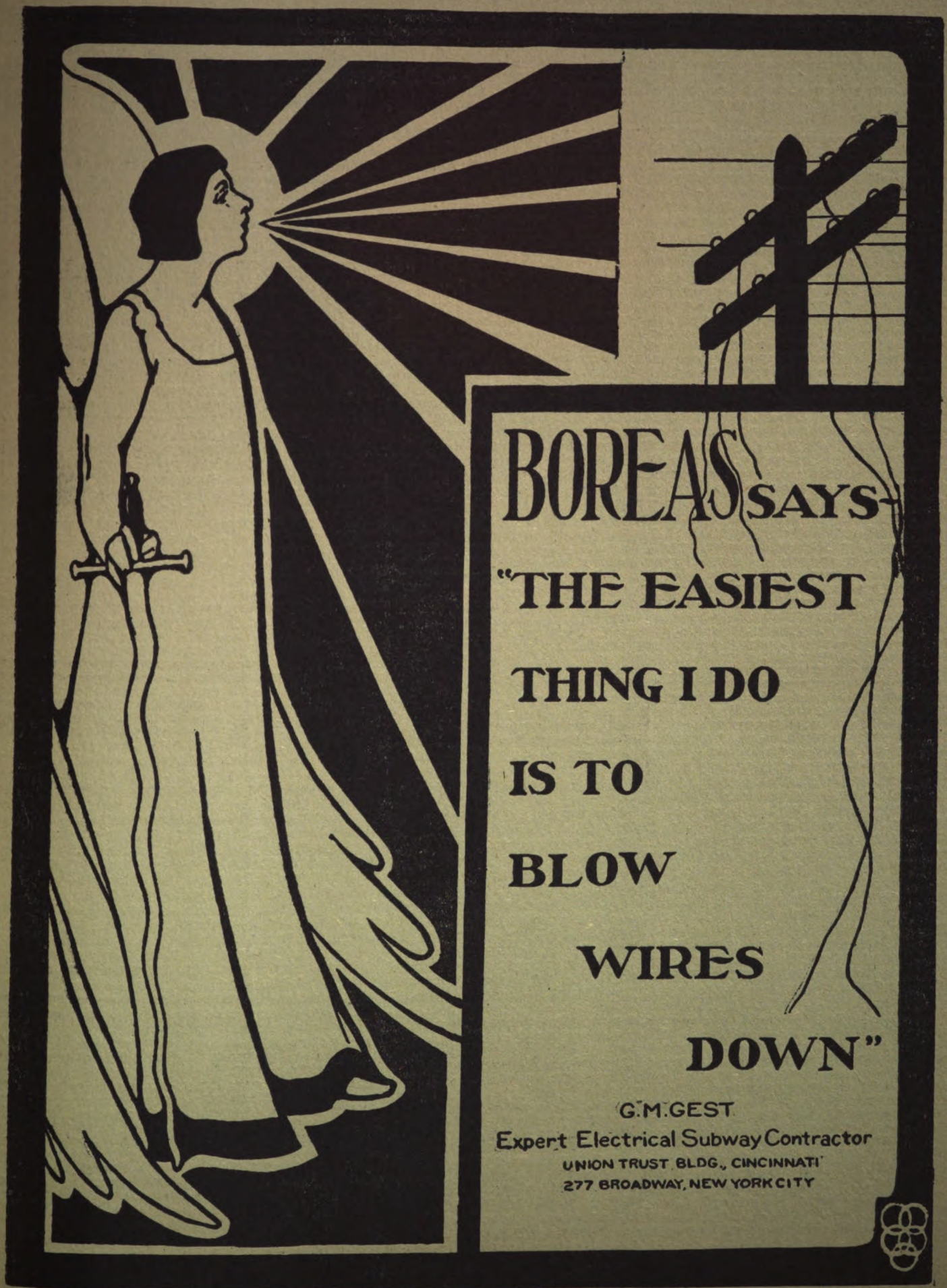

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AMERICAN ELECTRIC TELEPHONE CO.

CHICAGO, ILLINOIS, U. S. A.

Largest Manufacturers of Central Energy and Magneto Telephones and Switchboards.

We offer the only serviceable selective Telephone Systems. This Company issues the following bulletins:

Bulletin No. 7—Combined Telephone and Switchboard
" " 8—Wall Switchboard
" " 9—Samson Telephone
" " 10—American Express Switchboards
" " 11—Desks—Toll and Private Branch
" " 12—Visual Signal and Bell Style Switchboards
" " 13—Intercommunicating Systems
" " 14—Line Material and Supplies
" " 15—Bell Express Self-Restoring Switchboards
" " 16—Operator's Set and Accessories
" " 17—Parts of Apparatus

Bulletin No. 18—Magneto Telephones of All Kinds
" " 19—Central Energy Switchboards
" " 20—Central Energy Telephones
" " 21—Protective Apparatus and Terminal Equipment.
" " 22—Construction of Country Telephone Lines
" " 23—Eight-Party Selective Ringing Telephones
" " 24—Composite Telephone and Telegraph Lines
" " 25—Four-Party "Leich" Selective Telephone System
" " 26—Telephone Power and Ringing Equipment

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THE AMERICAN TELEPHONE JOURNAL

A Talk on the Representative Telephone Paper

All agree that Manufacturers must advertise their product. The question is, How?

Experience says: Select the Right Medium; then stick to it persistently.

We offer the following letter as a proof that this paper is the right medium:

"I think more of your Journal than of any other telephone paper published. Each week it contains practical and invaluable information."

FRED PETERSON, Mgr.,
Clarion & N. W. Telephone Co.,
Vernon Farmers' Telephone Co.,
Clarion, Iowa.

The Right Medium is the Representative Paper in its field. THE AMERICAN TELEPHONE JOURNAL has received a thousand and a half voluntary letters of praise from subscribers and advertisers. Surely this marks it the Representative Telephone Paper.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—DECEMBER 24, 1904—CHICAGO Number 26

PUBLISHED WEEKLY ONE DOLLAR A YEAR

Contents, Page 2. Advertisers' Directory, Page 9.

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The AMERICAN TELEPHONE JOURNAL

NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

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REPORT OF THE INTERSTATE CONVENTION..... By SPECIAL REPRESENTATIVE
A STUDY IN TRAFFIC..... By THE TRAFFIC MANAGER

The Operating Field.

GOOD SHOWING OF RED RIVER VALLEY COMPANY
KINLOCH IMPROVEMENTS AT ALTON, ILL.
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NEW UNITED STATES CIRCUITS
NEW TELEPHONE COMPANY OF INDIANAPOLIS TO ERECT NEW BUILDING
HOME COMPANY OF RICHMOND, IND., GIVES FREE TOLL SERVICE
ANOTHER INDEPENDENT STATEMENT
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MARYLAND'S LONG DISTANCE CONNECTION
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THE TELEPHONE IN THE COURTS
QUERIES
THE EDITOR'S PAGE
PATENTS
THE WEEK'S MESSAGES
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Best Prices to Small Independent Companies

McINTIRE'S (Patent) CONNECTORS for Iron Wires all Sizes and Special Single Tube Connectors ... ...

Special Connectors for Hard-Drawn Copper Wire ... ...

THE C. McINTIRE CO.
13-15 Franklin Street, Newark, N. J.

The Hadley-Williams Co.
German National Bank Building,
PITTSBURG, PA.

Telephone Devices and Appliances

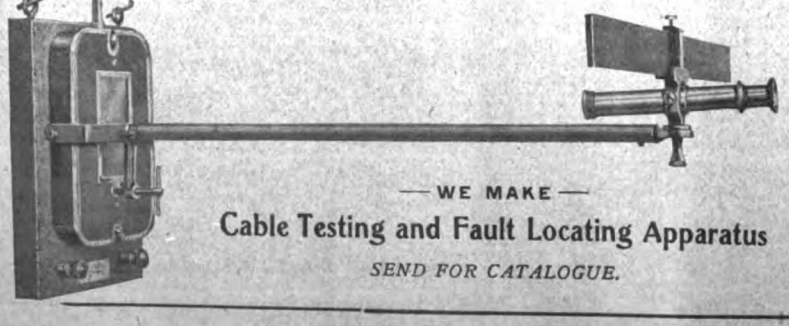
Latest and Newest Inventions. Indispensable.

Write for circulars and full information. We have exceptional means for financing new and useful devices and articles of various kinds.

The Leeds and Northrup Co. 259 N. Broad St. Philadelphia, Pa.

ELECTRICAL MEASURING INSTRUMENTS

D'ARSONVAL GALVANOMETER TYPE P.



Stimulated by the large demand for a good Galvanometer at a reasonable price, we have gotten out this instrument. It is well made, of finished workmanship, pleasing appearance and excellent working qualities. Its low price is due to good design, careful manufacture and production in quantity, and in no detail to poor material or slighted workmanship. It has the following desirable features: Simplicity of construction, attractive appearance, the moving system always entirely visible, a proportional scale, a damped system and quick working, strong suspensions that allow no zero shift, ample coil clearance and a sensibility that is ample for all ordinary electrical measurements and many precision measurements.

—WE MAKE—
Cable Testing and Fault Locating Apparatus
SEND FOR CATALOGUE.

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HAVING TROUBLE?

Ringing on your Farmer's or Party lines when the subscribers are listening on the line? Put our X-P Condenser in your Bridging Telephones and your troubles cease.

PRICE IS LOW

ACTUAL SIZE

YOU WILL WANT IT

ELECTRIC APPLIANCE COMPANY, Telephone Manufacturers—Electrical Supplies

Write us and we will give detailed information

CHICAGO and SAN FRANCISCO

MORGAN & WRIGHT TAPE IS GOOD TAPE

Possesses exceptional adhesive qualities.
Will not dry out.
Unrolls smoothly and easily.
Has uniform insulation.
Is peculiarly free from pinholes.
Has high insulation resistance.
Is capable of withstanding extreme heat much longer than is required by the most severe tests.
Possesses an uncommonly high percentage of insulation composition.

Samples and prices furnished on request.

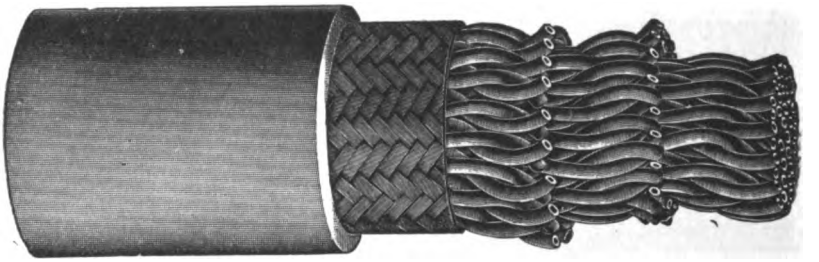
MORGAN & WRIGHT NEW YORK SAN FRANCISCO CHICAGO

WRITE FOR SAMPLE CARD OF WIRES.

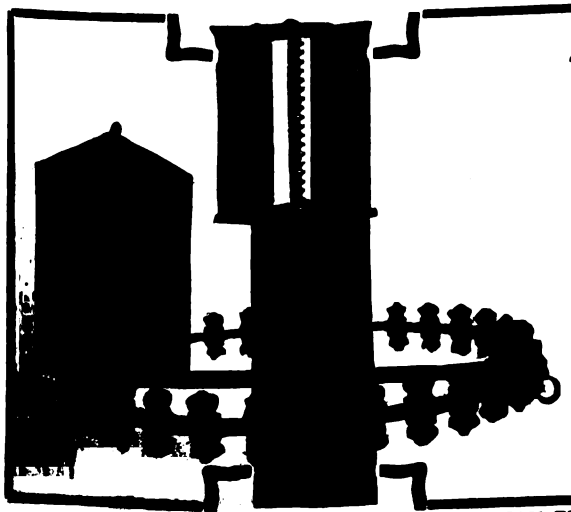
Manufacturers of

"Paranite"

RUBBER COVERED TELEPHONE WIRES AND CABLES :: :: ::



INDIANA RUBBER AND INSULATED WIRE CO. JONESBORO, IND.



THE HALL TYPE D. CABLE TERMINAL

WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***
Write for Catalogue.

Mountain State Electrical Company,
Sole Manufacturers,
WHEELING, W. VA.

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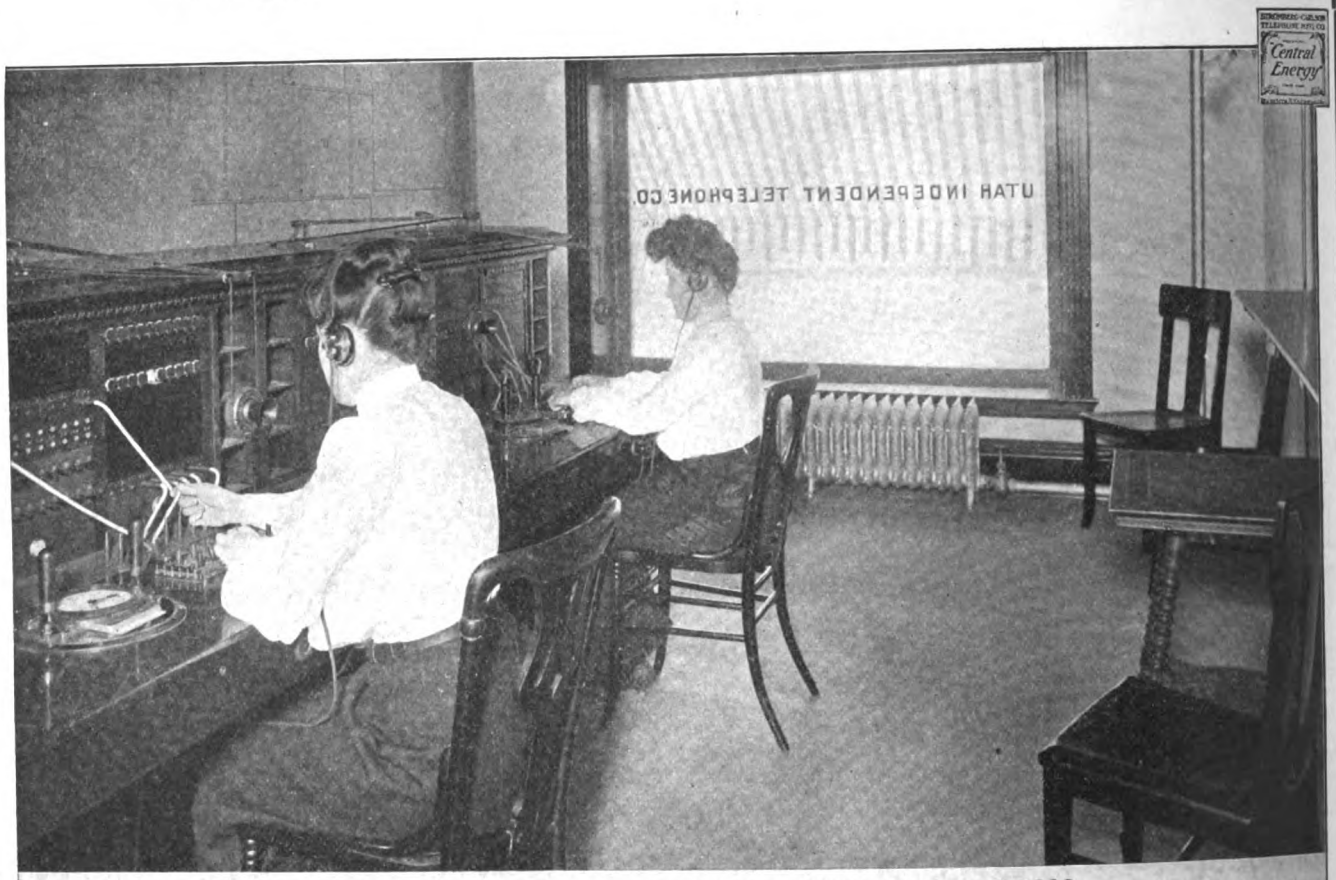
STROMBERG-CARLSON TOLL BOARDS

This illustrates one page taken from our Toll Board Bulletin No. 12-B.

The information we give on the subject of "Toll Equipments for Telephone Exchanges" should be of value to every exchange manager.



FOUR-POSITION TOLL BOARD—TWO SECTIONS
CABINET No. A-2474
AS OPERATED BY
UTAH INDEPENDENT TELEPHONE CO.
SALT LAKE CITY, UTAH

No other catalog or bulletin ever issued deals with this subject so extensively.
We are glad to mail a copy to managers interested in this subject.
Just ask for Bulletin No. 12-B.

Stromberg-Carlson Tel. Mfg. Co.

General Offices,
ROCHESTER, N. Y.

Western Sales Office,
CHICAGO, ILL.

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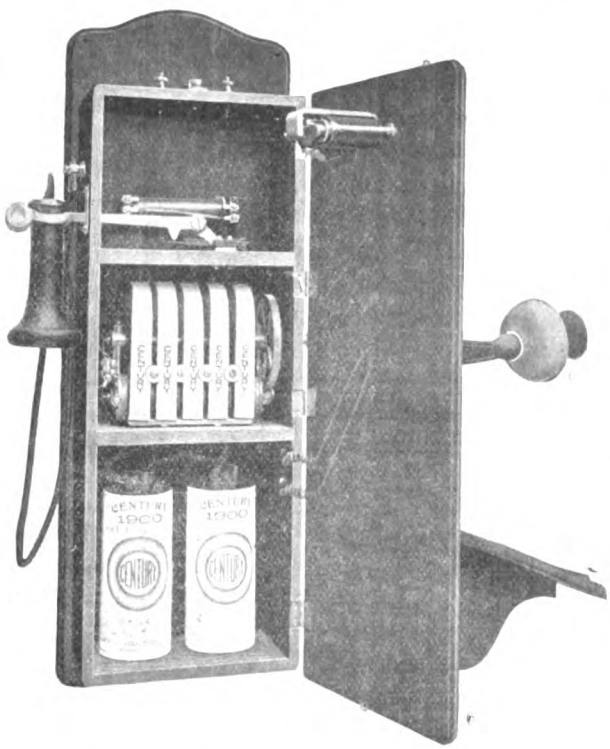
CENTURY
100% GOOD

Century Magneto Telephones

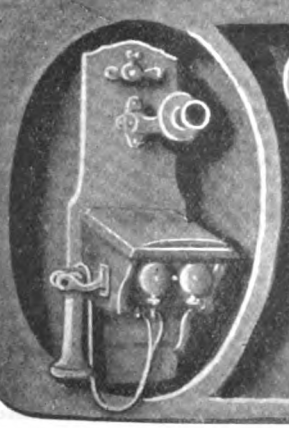


are all equipped with the most reliable and efficient transmitter yet devised. This transmitter is provided with **electrodes of pure platinum** metal; making it entirely free from "frying" and "sizzling" sounds, packing and all other transmitter troubles.

Century Telephones will talk better over longer lines than any other telephone made.

We will send you a transmitter to use on your switchboard on 60 days trial, charges prepaid, to give you an opportunity of testing same.

LET US SEND YOU A SAMPLE



CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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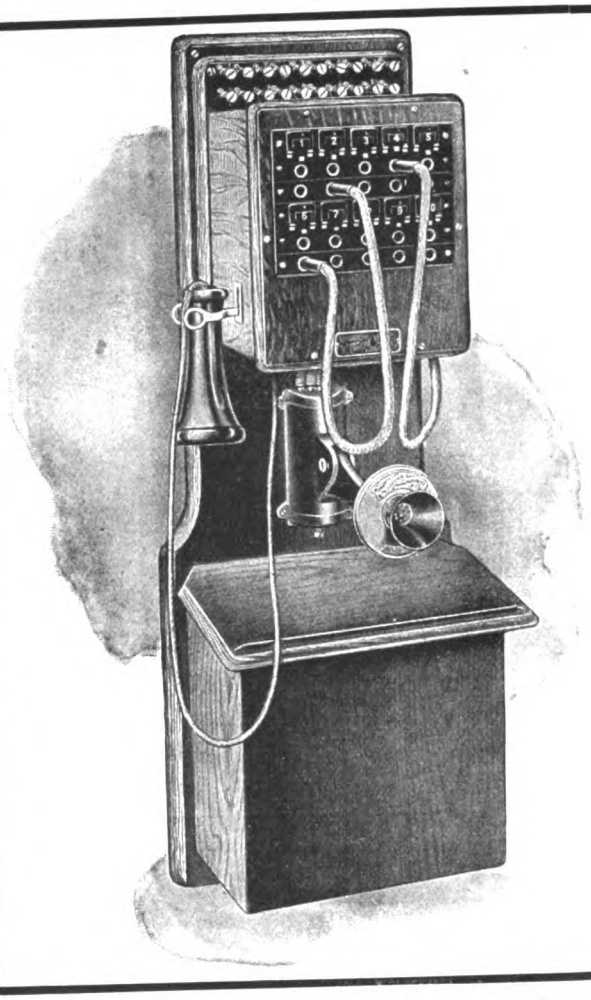


A Small One?

Yes, and the first one; but all great things start from small beginnings.

This is the first MONARCH board placed in operation and it used but 10 drops and jacks. Since then, just two months ago, we have sold over ,000 drops and jacks installed in boards. The smallest is here shown; the largest has 300 drops and jacks. It will interest you to get a complete description of the

Monarch Switchboard.

It will pay you to get our prices.

MONARCH TELEPHONE MFG. CO.

10-16 So. Clinton St. Chicago, Ill.

"COUCH"

Automatic Reset

Intercommunicating

'Phones

are made in several styles for both wall and desk use. The standard sizes are 10, 16, 20, 26 and 30 station capacity

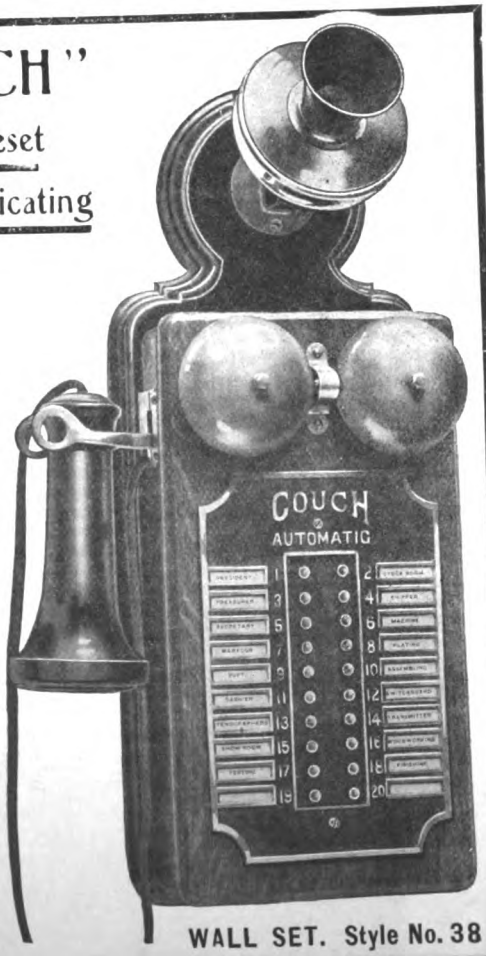
Local or Central Battery Systems

Ideal service for factories, offices, homes, etc.

Exchange men should promote this service and connect same to their exchange.

Increases your profits. Get posted anyway.

S. H. Couch Co.
Manufacturers
162 Pearl Street
Boston, Mass.



WALL SET. Style No. 38

READ HERE!!

Willow River, Minnesota, Nov. 4, 1904.

THE VOUGHT-BERGER CO.,
La Crosse.

Gentlemen:

Switchboard received in good shape. We have it installed, connected up with long distance, and everything is working lovely.

We certainly are well-pleased with the **Vought-Berger** telephones. We have received numerous inducements from other companies, but in no case have they been able to furnish the fine qualities of the **Vought-Berger** telephones.

Thanking you for your promptness and accomodations, I sincerely remain,

Sincerely yours,
J. W. SHERRICK.

THE VOUGHT-BERGER CO.

MAKERS OF FIRST AWARD
TELEPHONES AND SWITCHBOARDS
La Crosse, Wis.

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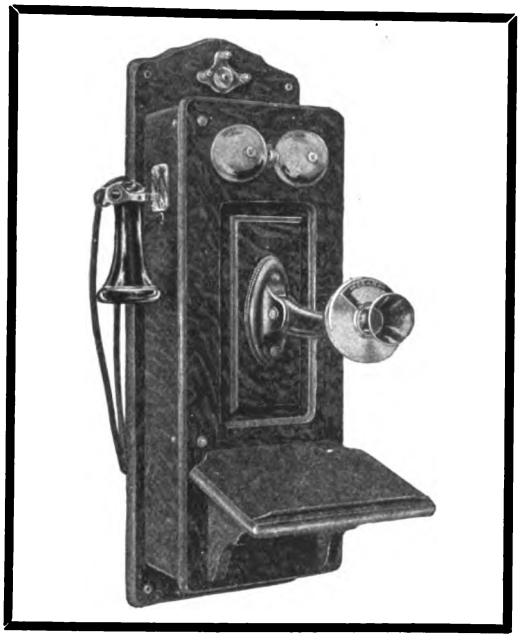
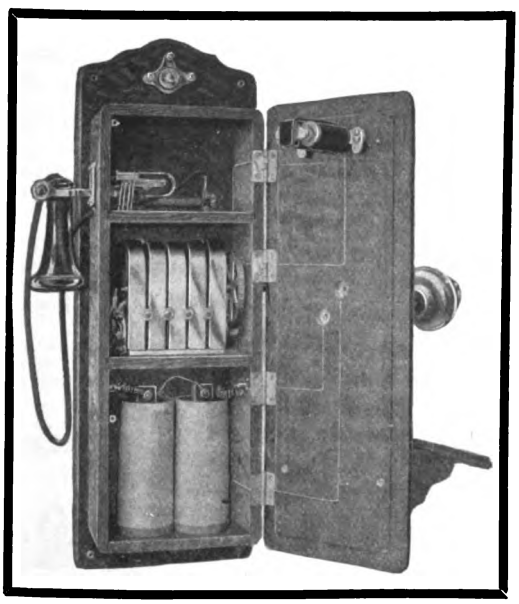
DEAN

TELEPHONE APPARATUS





SOME of the reasons why Dean Telephones are enthusiastically adopted after a thorough trial. Each telephone has:

¶ A hook switch with a removable lever which is normally *securely* locked in place by a spring catch. When removed, prevents breakage in handling and shipping.

¶ A transmitter arm which can be removed without disturbing the transmitter wiring.

¶ A very sensitive ringer, made so by the new Dean construction which absolutely prevents sticking.

¶ A powerful generator which has stood the test of time.

¶ A self-contained arrester with lock-nut line binding posts. An effective device.

¶ A tapper guard for protecting the ringer from injury.

¶ Four hinges with soldered connection spiral springs to carry wiring to the cabinet lid—does away with loose cords.

¶ Two locks which will not fall out when the cabinet lid is open.

¶ Mounting holes in corners of backboard metal bushed so as to prevent splitting or marring of woodwork.

¶ Circuit wiring run in grooves in woodwork which are afterwards filled with hot beeswax to prevent entrance of moisture—gives permanent and lasting results.

¶ All exposed metal parts entirely insulated from circuit, preventing disagreeable or dangerous shocks.

¶ And last but not least—A talking circuit consisting of the new Dean transmitter, receiver and induction coil, which will talk perfectly through the longest lines.

These telephones can be finished in quartered oak or walnut woodwork

---

We also make telephones for other classes of service. Let us tell you about them in our little Booklet No. 2, which will be mailed upon request

THE DEAN ELECTRIC COMPANY

ELYRIA, OHIO

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THE KELLOGG SWITCH-BOARD & SUPPLY CO.

Has Again Received

WORLD'S FAIR HIGHEST AWARD

FOR TELEPHONE SYSTEMS AND APPARATUS

IT was the GOLD MEDAL at the Buffalo Exposition. Now it is the GRAND PRIZE at the Louisiana Purchase Exposition, and the largest cities in the United States, equipped with Kellogg Telephone Systems, will heartily bear out with their recommendations the assigning of this award.

Write for our catalogues, bulletins and quotations.

The Kellogg Switchboard and Supply Co.

Green and Congress Streets, Chicago

SEYMOUR BUILDING
LOS ANGELES

ELECTRIC BUILDING
CLEVELAND

KEYSTONE TELEPHONE BUILDING
PHILADELPHIA

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You Don't Need Our System

if you don't operate party lines.

But if you have rural party lines and wish to give subscribers the advantages of private lines,

You Do Need Our System.

Better, quicker and more service at less operating expense.

Cost of system is small, benefit great, satisfactory to manager, subscriber, central operators and stockholders.

For Ground Lines, Straight Metallic and "Divided Circuit" Metallic Lines.

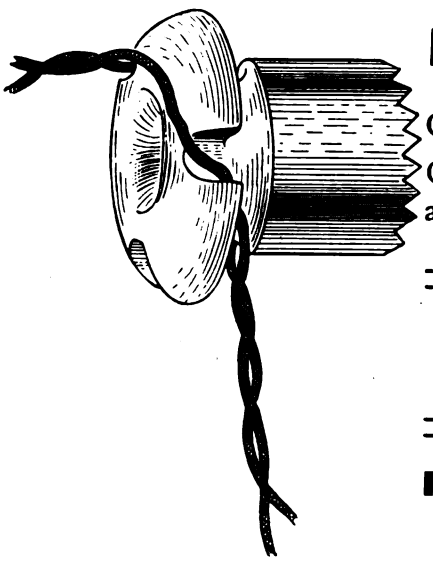
WRITE FOR PARTICULARS AND PRICES TO-DAY

The T. & A. Selective Call Co.

Sole Manufacturers GENESEO, ILL.

Patented, others allowed and pending.

Polk Cut in Knob



No tie wires

Can't pull off.

Can run wires in any direction.

Send for Sample

Price per M $20.00

Wholesale Telephone Supplies

The W. G. Nagel Electric Co.

TOLEDO, OHIO

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Chicago Insulated Wire Co.	33	Hipwell Mfg. Co.	11	Monarch Telephone Mfg. Co.	6	Stromberg-Carlson Tel. Mfg. Co.	4
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Controller Co. of America	—	International Telephone Mfg. Co.	36	Nagel, W. G., Electric Co.	9	Vought-Berger Co.	6
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Dean Electric Co.	7	Kemp, R. W.	36	Okonite Co.	36	Williams Telephone & Supply Co.	—
Doubleday-Hill Electric Co.	—					Yeshera Mfg. Co.	—

ADVERTISERS' DIRECTORY CONTINUED ON PAGE 10.

STORAGE BATTERIES

UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY — CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

NEW YORK OFFICE: 253 BROADWAY.

GENERAL OFFICES AND WORKS: BUFFALO, NEW YORK.

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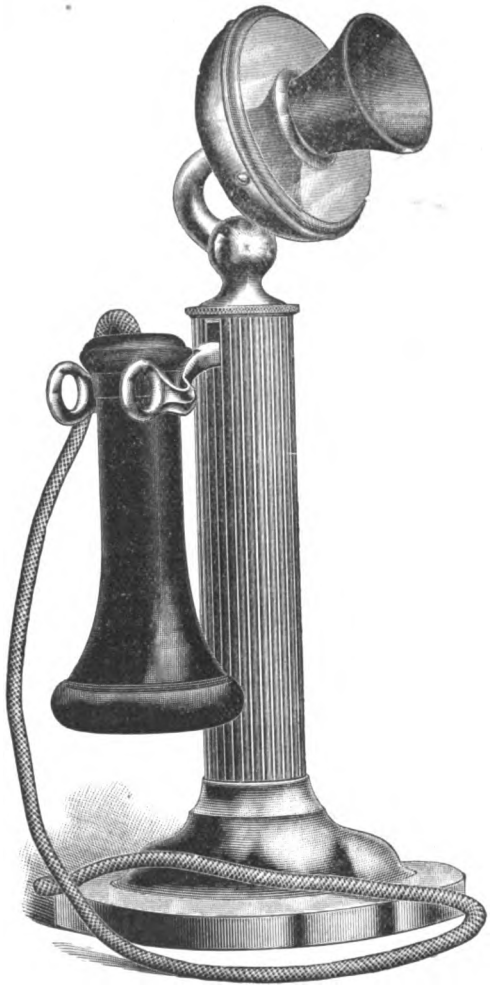
No. 19 Desk Stand



Self-Contained Hook and all connections withdrawn by removing one screw.

Platinum Contacts
Heavy Cast Hook

Sterling Electric Co.

LaFayette, Indiana

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CONTINUED ON PAGE 37.

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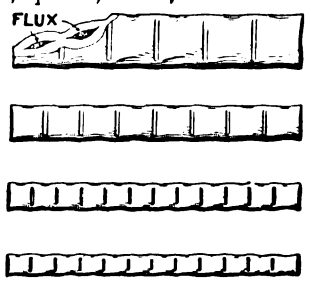

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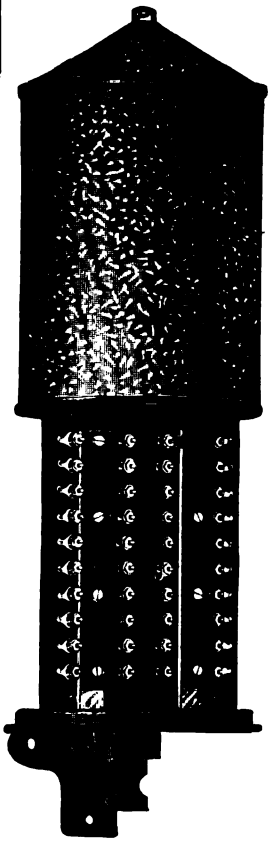

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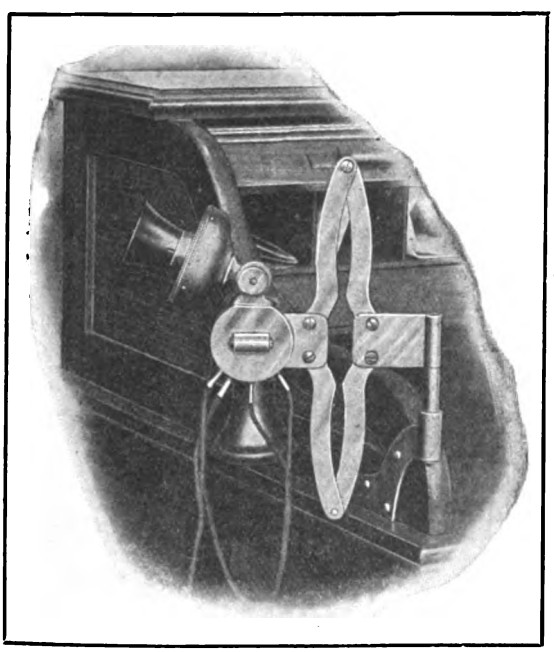

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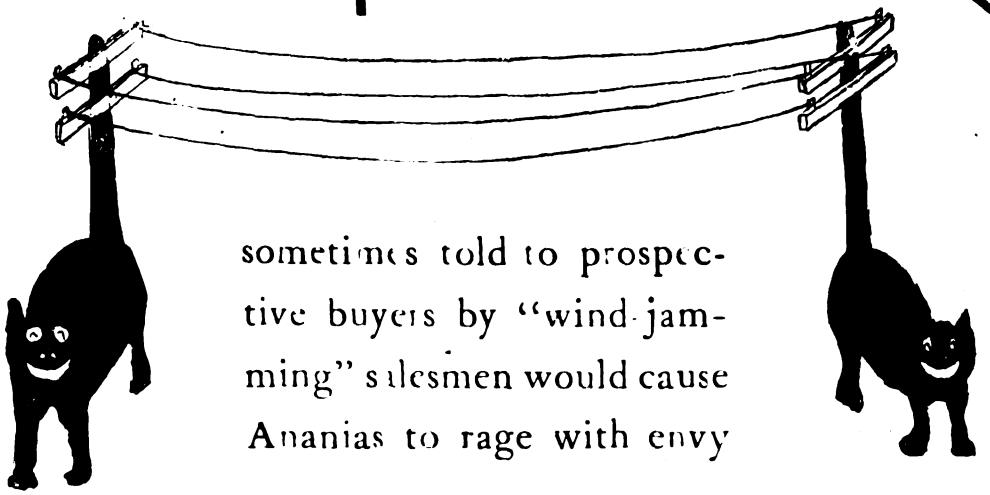

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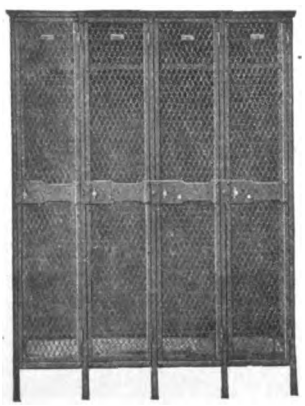

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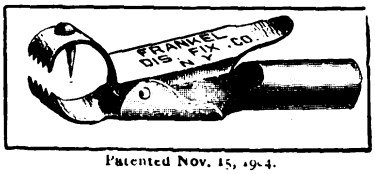

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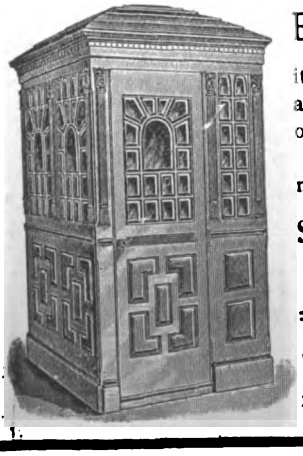

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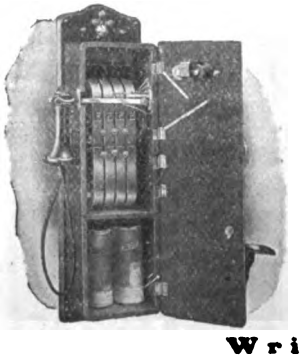

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TELEPHONE EXCHANGE ENGINEERING.

ARTICLE XXI.—CONDENSERS (CONTINUED).

BY RAY H. MANSON, ALBION D. T. LIBBY AND CHARLES A. SIMPSON.

EACH manufacturer has a certain schedule of tests to which the completed condensers are subjected. These tests can be divided into four classes: *First,* a direct current flash test for crosses between the terminals and between the terminals and case. *Second,* an alternating current test for strength of insulation. *Third,* a test for electrical capacity. *Fourth,* an insulation resistance test. It is best to make the tests in the order named, as heavy currents may damage the capacity and insulation.

1. *Direct Current Test-Flashing:* The apparatus and circuits necessary for this test are simple. Direct current is passed through a bank of lamps, as shown in Fig. 90, so that a short circuit of the terminals will not do damage. The application of the direct current circuit terminals to the condenser terminals will indicate a cross between the condenser plates by the illumination of the lamps, while the same test applied to the metal case and each terminal in succession will show which of the plates is grounded on the case. The most common cause arises when one of the tin foil plates comes into metallic contact with the other plate. This might be due to a mechanical shock or metal particle, and can, in some cases, be removed by mechanically jarring the condenser. A more permanent cure can be secured by resorting to a flash test, which is accomplished by applying the handles, shown in Fig. 90, to the condenser terminals. The short circuit within the condenser will then become heated, as considerable current will flow, and the foil around the point will be burned away. Thus with no appreciable damage to the condenser the trouble is permanently cleared.

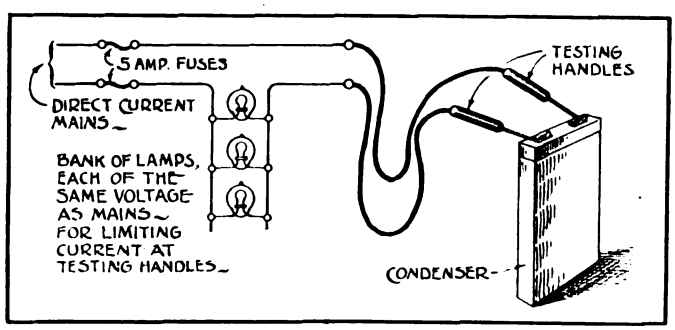

Fig. 90. Direct Current Condenser Test-Flashing.

When a short circuited condenser is attached to a direct current circuit, a flash will appear, and if the short circuit is cleared there will be no flash upon attaching the condenser the second time. Thus it is not necessary to have a bank of lamps in the test circuit to know by their lighting whether the condenser is short circuited or cleared. However, when the lamps are not used the direct current circuit should be protected by 5-ampere fuses. The flash test is a convenient way for the telephone company's repair man to clear condenser troubles, and is practically the only way to redeem broken down condensers.

2. *Alternating Current Test:* This test is similar to that just described, but an alternating current of about 60 cycles and from 220 to 400 volts pressure is substituted for the direct current source. This pressure is applied to the condenser terminals for about a minute, and if there are any weak places in the insulation which are liable to give trouble when the condenser is in commercial use, it will show by breaking down the insulation (dielectric material) and crossing the plates

Alternating current is not so easily handled in testing as the direct current, due to the fact that it will "flow" regardless of the condition of the insulation of the condenser plates from each other. If the condenser breaks down, and a low resistance cross results, the test lamps will light to their full brilliancy. These lamps should be of the same voltage as the alternating current circuit, so that they will not burn out if the condenser breaks down. The formula for condenser reaction given in a previous chapter (A. T. J., Vol. 10, page 163) shows an apparent resistance of 1,327 ohms for a two microfarad condenser, when subjected to a 60 cycle alternating current flow. With a 220 volt, alternating current testing circuit, less than 0.15 of an ampere will flow through the condenser, which is not sufficient to light the test lamps. In case of a breakdown this resistance is reduced to zero and the 220 volt lamps light to full brilliancy.

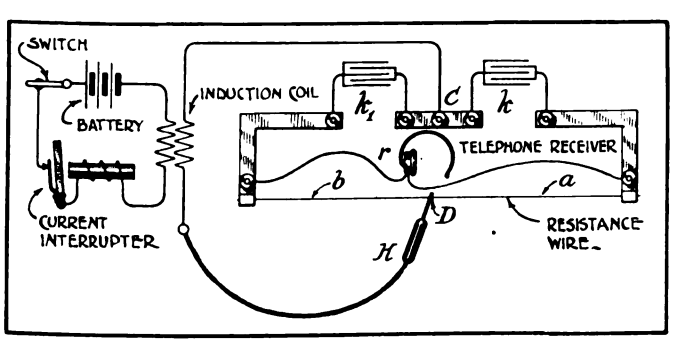

Fig. 91. Slide Wire Bridge Method of Measuring Capacity of Condensers.

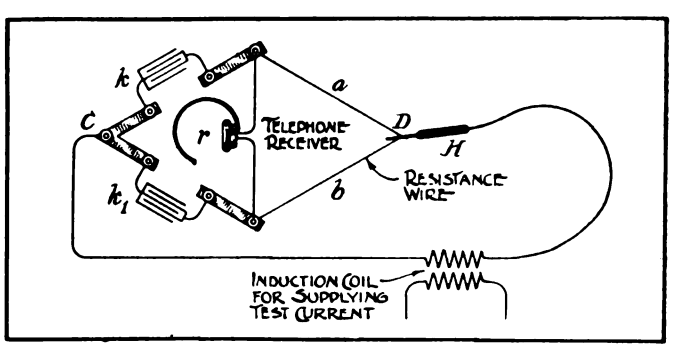

Fig. 92. Wheatstone's Bridge Illustrating the Principle of a Slide Wire Bridge.

3. *Capacity Tests:* The capacity of a condenser can be tested in many ways, but the most convenient commercial method is by the use of the simple *slide wire bridge.* The wiring of this test circuit is shown in Fig. 91, while a simplified diagram of the

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same circuit is given in Fig. 92. The latter will be recognized as the familiar Wheatstone bridge circuit. It has been previously shown that different capacities have different apparent resistances to an alternating current of constant frequency, the larger capacity acting as a smaller resistance. Now, if an alternating current is applied to the points C and D of the bridge, it will be possible to adjust the resistances in the arms of a and b so as to produce a "balance" and prevent any current from flowing through the telephone receiver r.

Then $a : b = k : k_1$.

With a equal to b or the handle H in contact with the middle of the slide wire, the unknown condenser will have the same capacity as that of the standard. With the unknown condenser

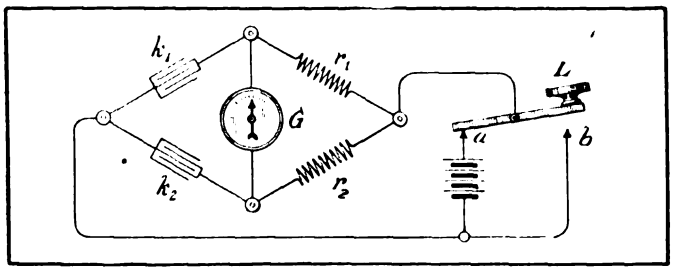

Fig. 93. Wheatstone's Bridge Method of Measuring Capacity of Condensers.

of higher or lower capacity it will be necessary to go to the right or left of this central mark to obtain a balance. In practice it is usually convenient to calibrate the slide wire so that it will read directly in microfarads. The best results are obtained when the standard condenser is taken with a capacity same as those under test should be. In the factory test for capacity, all condensers measuring below the standard are rejected, while those within an allowable percentage above are passed. It is customary to place a plus (+) sign after the capacity figure when marking condensers which have a capacity slightly greater than the standard.

Wheatstone Bridge Method: Fig. 93 shows the Wheatstone bridge method of measuring the capacity of condensers. The condensers k_1 and k_2 are connected in the two arms of a standard type Wheatstone bridge, and the resistances r_1 and r_2 adjusted so that there is no deflection of the galvanometer needle on the charge or discharge. The condensers are charged when the key L is thrown into contact with a and discharged when in contact with b. The bridge is balanced when $k_1 : k_2 = r_2 : r_1$,

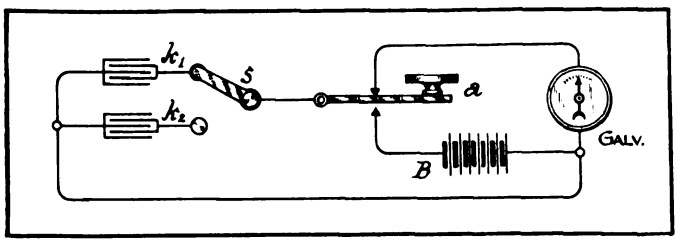

Fig. 94. Galvanometer Method of Measuring Capacity of Condensers.

the *larger* capacity acting as the smaller resistance.

For example, k_1 is a standard 2 M. F. condenser, and it takes resistances $r_1 = 400$ ohms and $r_2 = 300$ ohms to cause a balance.

The unknown capacity $k_2 = \frac{k_1 r_2}{r_1} = \frac{2 \times 300}{400} = 1\frac{1}{2}$ M. F.

Galvanometer Method: Another method of testing the capacity of condensers is by means of a ballistic galvanometer or other measuring instrument having the same properties. A ballistic galvanometer is an instrument designed to measure the strength of electric currents, which last only a short time, by the throw of a pointer or needle which takes a relatively long time to swing. In other words, the moving parts of the instrument are made heavy and are thus slow to move, but are free from any "damping" action so as to get the full effect of the electrical impulse.

The ballistic galvanometer test requires the comparison of two readings obtained by first charging a condenser of known capacity k_1, by a constant pressure, direct current, producing a deflection d_1, and then repeating the operation on the condenser of unknown capacity k_2, giving a deflection of d_2. The unknown capacity is then: $k_2 = k_1 \frac{d_2}{d_1}$.

The connections for this test are shown in Fig. 94. The switch s allows either the standard or unknown condenser to be connected. Pressing key a closes contact with one pole of the battery B, which is preferably of about 150 volts pressure, while releasing the same key allows the discharge from one or the other of the condensers, according to the position of the switch s, to pass through the galvanometer and give a swing to the needle which can be easily read.

For example, suppose that the full swing of the needle for the standard condenser of 2 M. F. capacity was 104 divisions and that of another condenser only 78 divisions. The unknown capacity is given by the above formula:

$$k_2 = k_1 \frac{d_2}{d_1} = 2 \frac{78}{104} = 1\frac{1}{2} \text{ M. F.}$$

If the standard condenser is of the adjustable type, it would be found expedient to adjust its capacity so that the two galvanometer readings are the same; when the unknown capacity will be equal to the amount of the standard capacity then in the circuit. In other words the nearer the ratio $\frac{d_2}{d_1}$ is to unity the greater the accuracy of results.

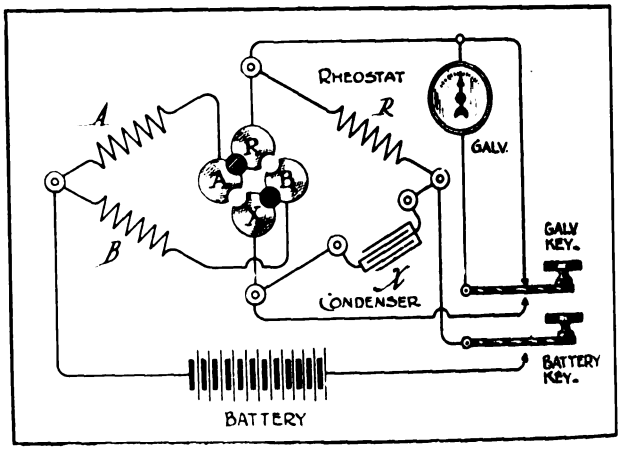

Fig. 95. Wheatstone's Bridge Method of Measuring Insulation Resistance of Condensers.

3. *Insulation Resistance:* The insulation of one plate of a condenser from the other is never perfect, and thereby allows current to leak through the insulating medium. On account of the high resistance of this insulating medium, its value is expressed in megohms; a megohm being a convenient term for a million ohms. Commercial telephone condensers are made with insulation resistances of from ½ to 50 megohms, according to the use to which the condenser is to be put and the space allotted to it.

One type of 2 M. F. condenser used in a common battery telephone is made with a low insulation resistance of about 3½ megohms. As this condenser is normally in the line circuit when the telephone is not in use it is leaking central battery current on an average of 23½ hours per day, one-half hour being allowed for conversations. This waste of current is negligible, even in a 10,000 line exchange (10,000 bridged condensers), as the insulation resistance of one condenser is 3,500,000 ohms or a total of 350 ohms for the entire exchange cited.

Insulation resistance can be measured by means of the Wheatstone bridge, voltmeter or galvanometer.

Voltmeter Method: A high resistance voltmeter is often used for measuring the insulation resistance of condensers.

Wheatstone Bridge Method: Up to 10 megohms the insulation resistance of a condenser can be measured on a standard

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Wheatstone bridge. In testing such high resistance, however, it is necessary to provide a battery or direct current source of at least 100 volts. The bridge is then operated as in measuring ordinary resistances. The ratio of the bridge arms *A* and *B*, Fig. 95, should be taken as 1 to 1,000.

For example, a condenser under test requires 3,500 ohms in the rheostat of the bridge in order to cause the balance, the arms *A* and *B* being respectively 1,000 and 1.

Then $X = R\frac{A}{B} = 3{,}500\frac{1{,}000}{1} = 3{,}500{,}000$ ohms or 3.5 megohms. While small portable testing sets are designed for these high readings, there are discrepancies and difficulties entering into their practical use, especially where many condensers are to be measured. For these and other reasons, chiefly the low range (less than 10 megohms), this type of instrument is not used in commercial condenser testing.

REPORT OF THE INTERSTATE CONVENTION

By Special Representative.

THE fourth annual convention of the Interstate Telephone Association began its opening session in the banquet hall of the Auditorium Hotel, in Chicago, Tuesday afternoon, December 13. President Henry A. Barnhart, of Rochester, Indiana, was in the chair. E. M. Coleman, of Louisville, Kentucky, served as secretary.

As soon as the convention had been called to order, at the suggestion of the secretary, a credential committee of three was appointed to assist the secretary in limiting the attendance to properly accredited representatives or members. W. Mathews, of Kentucky, F. C. Holdoegel, of Iowa, and Mr. Flee, of Ohio, were appointed to this committee.

Mr. Holdoegel quoted the resolution passed by the last convention recommending that at future meetings no one be admitted at any session without proper credentials, and moved that the word executive be inserted before the word sessions. The motion was carried.

These preliminaries having been disposed of President Barnhart read his annual address, and was followed by Secretary Coleman, who read the annual report. After the reports were read the president appointed Mr. Gibbons, of Missouri, doorkeeper during the sessions of the convention, and then George N. Bandy, of Iowa, was called upon for the report of the committee appointed to investigate the attitude of express companies toward Independent telephones. Mr. Bandy said that as express companies had generally changed the methods complained of he had thought it unnecessary to make a detailed report.

The question of consolidation with the National Association was called up, and the minutes were read of a joint conference between the officers of the two associations held at the Auditorium November 18, 1904. These minutes included written statements by the president of the Interstate and the president of the National Association in regard to the meeting, and to their attitude toward the consolidation movement. It appeared that the conferees were all heartily in favor of the plan, but the committee representing the Interstate Association had no power to act. A resolution was therefore adopted pledging the members to secrecy in regard to the movement until after the annual convention of the Interstate Association, when a committee would be appointed with power to act to meet a similar committee from the National Association.

After accepting an invitation to visit the plant of the American Steel and Wire Company, at Waukegan, Thursday afternoon, the association went into executive session to consider the matter of uniting with the National Association.

Wednesday's Session.

THE association held an interesting session Wednesday afternoon for the consideration of papers on various subjects important to Independent telephony. One of the most important of these had to be omitted because of the illness of O. M. Bake, vice-president of the Miami National Bank, at Hamilton, O. Mr. Bake had been assigned the subject, "Why Independent Telephone Securities Do Not Command the Market Price They Deserve According to Their Earning Capacity."

Theo. Thorward, president of the Indiana Independent Telephone Association of South Bend, Ind., read a paper on the subject, "What the Independent Telephone Companies Owe the Public; What the Public Owes the Independent Telephone Companies."

In the discussion of the paper which followed, the question was raised as to the attitude of the Illinois Telephone Company in Chicago toward the Independent companies who are trying to get into the Chicago field. Mr. A. B. Conklin, of the Interstate Independent Telephone and Telegraph Company, was asked to reply, as his field of operations immediately adjoins the Chicago territory. Mr. Conklin replied that his company had not been turned down by the Illinois company, and yet they were feeling somewhat discouraged in the matter. They had made application for connection with the Illinois companies' lines, and had even offered to put in the connecting line at their own expense, but had not yet received the desired permit, action having been postponed from time to time. Mr. Conklin stated that the matter was of considerable importance to Chicago people, as the Interstate company could now give them access to seventy-five thousand telephones over first-class lines.

An interesting discussion was precipitated by the announcement that Mr. Richmond, an Independent telephone operator from Southern Wisconsin, was present in search of light. He was considering an attractive proposition from the Bell people, who desired him to connect with their toll system

Mr. E. D. Graham, of the Mexico Telephone Company, Mexico, Missouri, read a short paper on the subject, "Manufacturers' Duties and Their Dues." Mr. Graham's conclusions were that it is the efficiency of the service that counts, and that this efficiency cannot be attained without good construction and good apparatus. It is the duty of Independents to uphold the hands of the people who make good apparatus, and to encourage Independent manufacturers as far as possible. The duty of the manufacturer is to protect the people to whom they sell apparatus and to give them the best equipment that can be made, rather than to find a market for their goods by organizing competing companies.

On motion of A. C. Barber, the chairman was instructed to appoint a committee of three to wait upon the Illinois Telephone Company and ascertain its intentions in regard to connecting with the Independent lines. The chairman appointed Mr. Barber, Mr. Veneer, of Kankakee, and Mr. Thorward, of South Bend.

Mr. John E. Jones, of Jonesboro, Arkansas, appeared as a substitute for Mr. J. H. James, president of the Minnesota Independent Telephone Association. His subject was "Uniformity of Equipment and Standardization of Apparatus the Imperative Demand in the Operating Field."

Thursday's Session.

THE association in executive session had voted to consilidate with the National Independent Telephone Association according to plans to be formulated by a joint committee of five from each organization. The session of Thursday, therefore, was the final meeting of the Interstate Independent Telephone Association.

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After the convention had been called to order the president appointed the following nominating committee to select officers for the ensuing year: Messrs. Lichty, of Iowa; Graham, of Missouri; Hull, of Illinois; Mathews, of Kentucky; Harper, of Wisconsin; Fee, of Ohio, and Reeves, of Indiana.

A short discussion of the subject which had been assigned to O. M. Bake, of Hamilton, O., "Why Independent Securities Do Not Command the Market Price They Deserve According to Their Earning Power"; then followed, the concensus of opinion, ascribing the reason to the practice which obtains among brokers of calling in Bell men to determine the value of these securities.

H. C. Barber, of Ottawa, Ill., chairman of the committee appointed to confer with President Wheeler, of the Illinois Telephone Company, of Chicago, and ascertain the intentions of his company toward the Independent lines, reported. Mr. Barber said that the committee had had a pleasant conference with Mr. Wheeler, who had informed them that his company stood ready to connect with any Independent company at the city limits whenever he could be assured by responsible parties that such Independent company possessed standard construction and equipment.

As Mr. Conklin, of the Interstate Independent Telephone and Telegraph Company, had explained Wednesday the repeated attempts his company had made to connect with the Chicago concern, the question arose what would be considered "standard." Mr. Barber stated that from the remarks of President Wheeler he thought that any first-class construction and equipment would be acceptable. There being no better constructed system in America than that built by the Interstate Company, now seeking entrance into Chicago, a motion was made and carried that the committee, with Mr. Conklin added, be further instructed to go to President Wheeler and present to him in a proper manner the facts concerning the Interstate lines and ask for a connection as soon as possible, according to his promise.

Of the four papers announced on the programme only one was read. Senator Rome C. Stephenson, of Rochester, Ind., presented a carefully prepared paper on the subject, "How to Avoid Personal Injury and Responsibility in Telephone Construction Work and Maintenance."

Mr. Stephenson stated that it would be impossible to lay down any rules that would avoid all responsibility, but certain safeguards could be adopted whereby the loss could be reduced to a minimum. He cited the importance of using material not defective, notably cross arms which are free from all knots and decay. The courts hold the company liable in cases of accident from defective material known to the company and not known to the workman. A corporation is not bound to use the best material and appliances that can be obtained, but is required to use all reasonable care and to purchase material and appliances that are reasonably safe. If it does not, it will be held responsible for all injuries received on account of that neglect. Therefore it is important that all material should be carefully inspected by a competent and reliable inspector before being used.

Especial care should be taken to keep telephone wires away from electric lines carrying a heavy current. If necessary to cross such lines, a space of at least four feet should be left between them to allow for sagging, and a guard wire should be placed below if possible.

Courts have decided that electric lights and trolley lines should be constructed so as not to interefere with telephone lines. When a telephone company uses the ground for the return circuit, and an electric railway operates also with a single-wire system, using the ground for the returning current, but in such a way that abnormal electric conditions result, the courts have held that the railroad company is liable to the telephone company for damages ensuing.

It is often unavoidable to place telephone wires near electric lines, in which event there should be regular and systematic inspection at the danger points. Dead wires should be removed or fastened up out of reach in case they should ever become alive. Only by exceptional vigilance can a telephone system be constructed so as to reduce the danger of accident to the minimum point.

Messrs. Stanton, Young, Thompson and Johnson participated in the discussion which followed. The principal points emphasized were the necessity of employing competent men and the advantage of carrying an ample indemnifying insurance.

L. L. C. Brooks, of St. Paul, chairman of the committee appointed to confer with the United States Postoffice Department concerning the order issued by Postmaster Payne to the effect that only Bell telephones should be used in postoffices, could not be present. His report was read by the secretary. It developed from the reading that the committee had done an immense amount of work and had accomplished a great deal of good, principally in calling general attention to the excellence and growth and importance of the Independent telephone systems. They had ascertained that Postmaster-General Payne had been an officer and stockholder in a Bell company. He acknowledged that such instructions had been sent out and that but one telephone system would be used by the department, and that one having connections with Washington. Such a storm of protest went up from all over the country that the department had to materially change its views. As a result, the orders are no longer carried into effect, and the department head stated that hereafter each case would be decided on its merits. The committee attacked the department in its most vulnerable point, namely, in the appropriation bill. A clause was added to the bill which passed the House to the effect that no part of the appropriation be expended in any office where the postmaster is required to use no telephone except the Bell. This clause was stricken out in the Senate, as the bill finally passed contains no reference to the matter.

The report of the treasurer, A. B. Conklin, was read. It showed an empty treasury, except as to the money received from new members during the convention. As there were a number of claims unpaid Mr. Barber, of Ottawa, Ill., was appointed chairman of a committee to audit the bills and raise sufficient money among the members to take care of all just claims.

On motion of Mr. Thompson a vote of thanks was extended to the retiring officers of the association.

The appointment of a committee of two from each State was authorized to gather information as to the condition of Independent toll lines, and forward this to the committee, who is to wait upon the Illinois Telephone Company. The committee is to report not later than January 15, 1905. The names of the committee will be announced to the secretary later.

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A STUDY IN TRAFFIC.

By the Traffic Manager.

THE figures which have preceded have illustrated loads which may be expected in a large city, a medium-sized one and in manufacturing and rural communities of small size. It remains to consider the proper load line of a village; for, while the subscribers in centers of this description do not form a large proportion of the total telephonic clientele of the country, the number of small exchanges of under 500 subscribers is numerically very large, and consequently of corresponding importance.

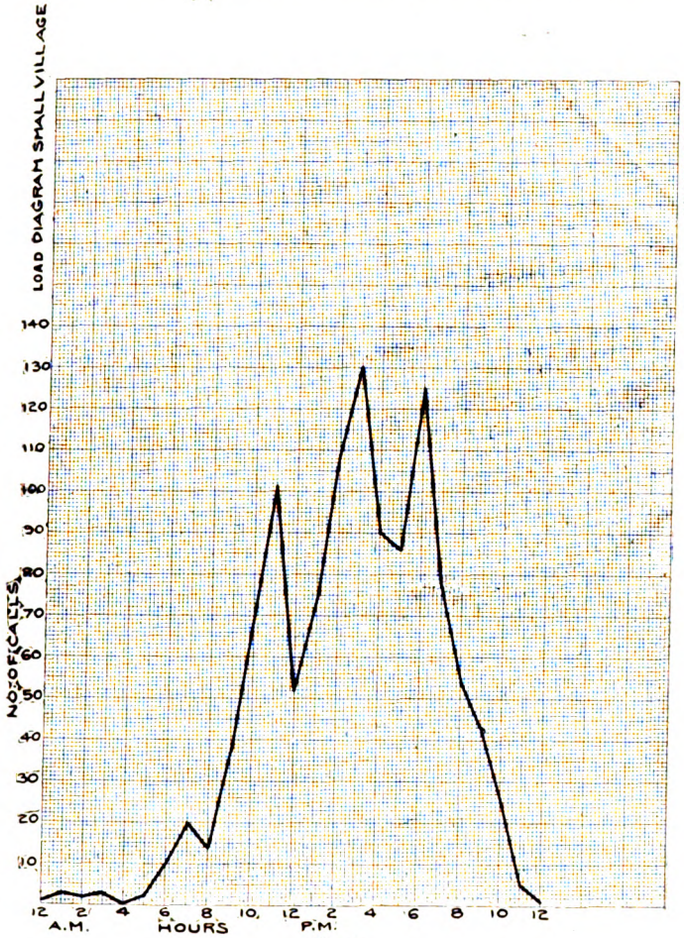

Fig. 7.

Fig. 7 is a load line from a village of about 2,000 inhabitants, served with a non-multiple switchboard of three positions, containing about 200 lines. The diagram presents a striking contrast to those which are obtained from larger centers. The first noteworthy feature is the decided peak occurring at 7 A. M., and then succeeding this is another peak at 11 A. M. The reduction in the rate of traffic which inevitably occurs during the middle of the day is here noticeable as taking place at exactly 12 o'clock, and is relatively greater in proportion to the total load line than is found in larger places. In the afternoon there are two peaks, one at three o'clock and one at six. But little study is necessary to convince the reader that an inspection of the load line of a telephone exchange reflects with the utmost fidelity the daily habits and customs of the town from which it is taken. It is exceedingly instructive to transform the total load lines obtained from telephone exchanges in such a manner as to show the number of messages per line instead of the gross load in calls.

In figure 8 this transformation has been performed for tne load diagram previously shown in Fig. 3. As this is simply a transformation of co-ordinates, the shapes of the diagrams giving the total load of messages per line are similar. But the diagrams showing the messages per line is particularly instructive, as indicating the rate at which telephonic business is received. An inspection of Fig. 3 indicates a great difference in the total loads between the lines of the outlying offices and those of the main exchange. In Fig. 8, however, this difference is markedly reduced, thus showing that, while the gross loads of the main office and its companions may differ very widely, the messages per line in all districts closely approach each other.

Fig. 9 shows a similar transformation made for the load lines of Fig. 4; and in this case the difference in the relative co-ordinates is still less marked, showing that in the medium-sized city the call rate in the office district and in the outskirts is nearly the same.

A knowledge of the unit loads to which the various parts of the telephone plant may be properly subjected is of the greatest value to the general manager, as showing whether all parts of the exchange are working at the proper rate or not; and it is vital to the engineer to enable him to design adequate equipment to fit new conditions. Traffic record forms the only basis from which accurate statistics of this description can be obtained.

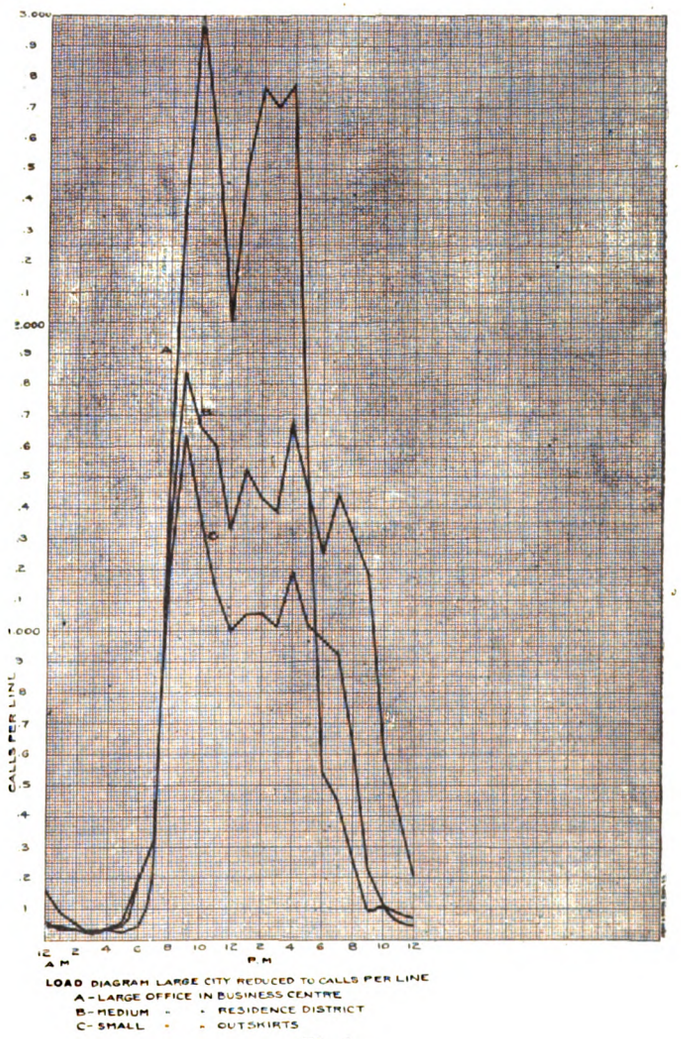

Fig. 8.

one of its most useful purposes is that of supplying information to be used in this manner.

Fig. 10 is a diagram giving information relative to the loads which operators are able to carry. In this diagram the lower scale represents upon a percentage basis the total number of returns which have been employed in constructing the curves. The left-hand scale represents the number of calls per day. In the top of the chart four curves will be found. The first pair (Nos. 1 and 2) refer to the total number of calls which operators handle

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per day. No. 1 relates to the operators under flat-rate service, and No. 2 those working upon measured service positions. The other pair refer to the number of calls in the busy hour, No. 3 dealing with flat-rate positions, and No. 4 those containing measured service lines. This chart is based upon returns from exchanges in large cities, and the method of using it can best be explained by example. For instance: Select, say, 1,700 upon the right-hand scale, follow horizontal towards the left until curve No. 1 is intersected, and thence a vertical line to the bottom of the sheet, finding 55 per cent. The interpretation of this result is that 45

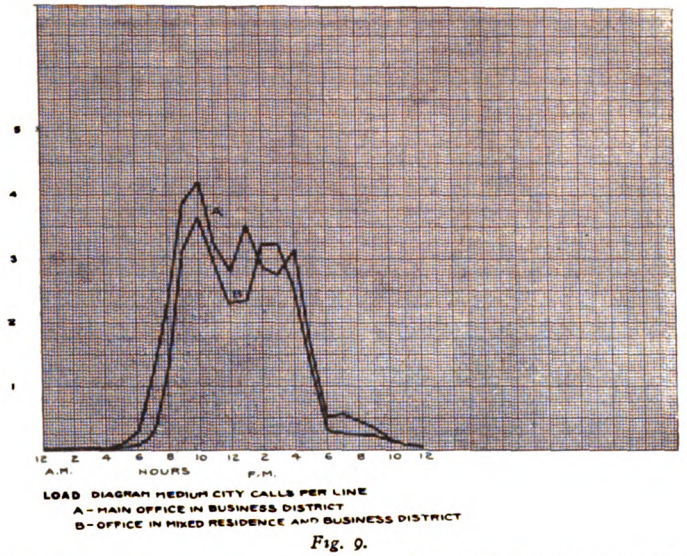

Fig. 9.

per cent. of the operators under consideration handle 1,700 or less calls per day, while 55 per cent. handle 1,700 or more calls per day. Again select, say, 2,100 upon the right-hand scale, follow a vertical to the same curve, then a horizontal to the bottom of the sheet and 9 per cent. is found; which means that 9 per cent. of the operators from which the returns have been secured handle 2,100 calls or more per day, and 91 per cent. 2,100 calls or less.

Curve No. 2 is drawn to the same scale, and from it statistics may in a similar fashion be obtained relating to work upon measured service positions. The curves 3 and 4 are read in the same manner, giving information as to the loads in the busy hour.

Curve 5 is plotted to show the ratio between the work done by operators upon measured service positions and those upon flat rates.

For this curve the same bottom scale is used as applies to the preceding ones, while the ratio scale is to be found upon the left-hand side of the sheet. For example, take 90 per cent. upon the bottom scale and follow a vertical to curve 5, thence a horizontal to the left-hand side; 54 per cent. is obtained, this means

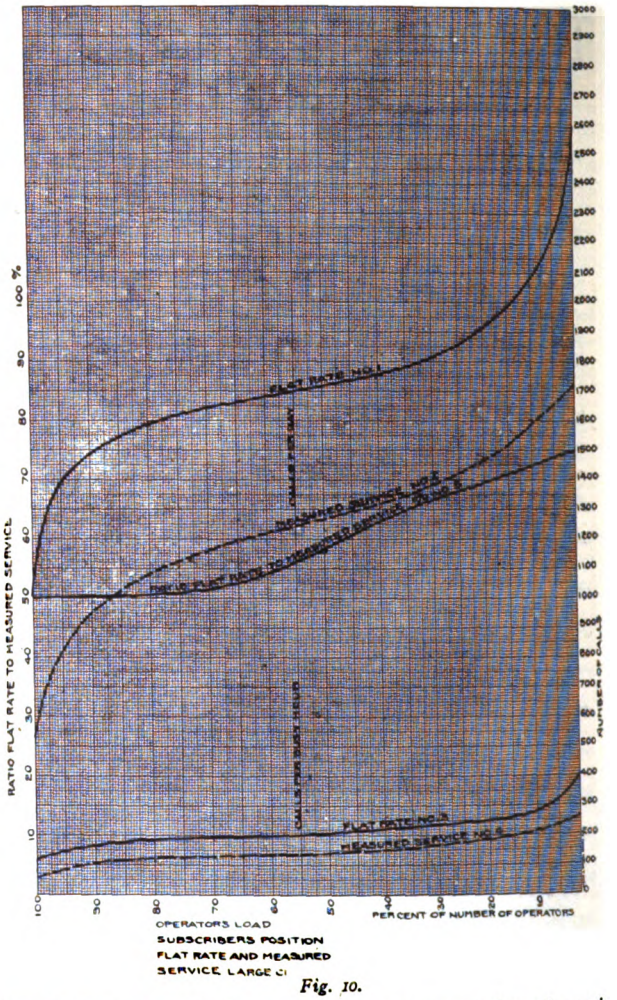

Fig. 10.

that 60 per cent. of the operators upon measured service work handle 54 per cent. or more of the calls done by flat-rate operators, and that 40 per cent. handle 54 per cent. or less.

Subsequent loads of operators working in smaller cities, and those which may be used with trunk work will be discussed.

EDITOR'S NOTE:—This article is the third in the series dealing with traffic conditions.

FIGHT AGAINST BELL IN MISSOURI.

RESOLUTIONS adopted by the Retail Grocers, Butchers and Bakers' Association and by the Retail Druggists' Association, of St. Joseph, Mo., pledge the members of those bodies to cause the removal of the instruments of the Missouri & Kansas Telephone Company from their places of business if the annual rental of the telephones is increased to $60 January 1, as has been announced by the Bell Company.

The grocers and butchers adopted a resolution, declaring that they would refuse to pay the increased rental. The druggists then met and adopted a similar resolution. A representative of the Grocers and Butchers' Association addressed the druggists, urging them to co-operate in the effort to prevent the increase in the cost of Bell telephones.

"We pledged ourselves to discontinue the use of Bell telephones after January 1, unless the price remains where it is now," said President G. W. Akers, of the Retail Grocers and Butchers' Association.

"We are paying $50 per year for the Bell telephone now. Some time ago, representatives of the Missouri & Kansas Company called upon the merchants of St. Joseph and told them that the service was to be improved by the installation of metallic circuits. Many merchants were persuaded to allow the change. Those who refused to yield were told that metallic circuits would be put in whether they liked it or not and the price would be $60 per year, an advance of ten dollars. We cannot afford to pay that price when the Citizens' cost but $40 per year."

Contained in the Missouri & Kansas Telephone Company's contract for this year is the following extraordinary provision, which seeks to permit the company to readjust its rates in the event the city, county, or State attempts to make any change in the corporation's rate of taxation:

"If the city, county, or State in which the subscriber's telephone is to be located, shall require payment of any license, privilege or occupation taxes, fees, rentals, or similar charges by the company on account of its business or property, other than that mentioned in the city ordinances accepted in writing by the company, then there shall be added to the rate herein and paid to the company in the same manner as such rate, such proportionate part of the total amount for each year of such taxes, fees, rentals and charges as the number of telephones in use in the city, county or State bears to the total annual amount of such taxes, fees, rentals and charges."

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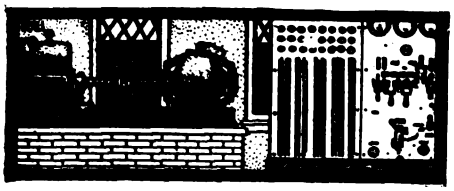

QUERIES

Questions on any subject relating to telephony will be answered on this page.

LONG-DISTANCE LEADS.—(475.)

We are contemplating changing the lead of a long distance line carrying a number of circuits. We can save a long distance by crossing the bed of a creek, which is frequently quite dry. What bracing do you advocate?
G. L.

A method frequently used in building power and telephone circuits where there is an extra amount of stability required is to use two poles and place the cross arms as shown in Fig. 475. Such

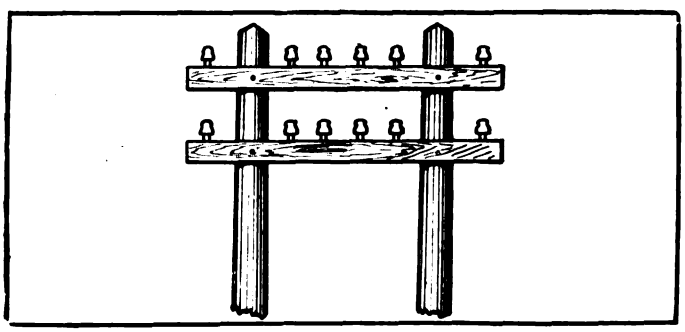

Fig. 475.

a scheme should meet your requirements and, if properly braced, will be as nearly permanent as it is possible to make a line. This is commonly called an H fixture.

LOCATING OPENS.—(476.)

What is the best method of locating an open wire on a copper metallic circuit?
T. R. S.

It is very difficult to locate accurately the position of a break in a conductor. If the line is highly insulated and the break is free from all grounds, it is possible to obtain the approximate location by measuring the capacity of the line, provided the capacity per unit of length is known. Thus, for example, in an underground cable, the position of the ruptured end of the conductor may be ascertained by measuring the capacity of a neighboring conductor, and then the capacity of the ruptured one up to the break. It is often desirable to make a measurement from each end, in order to locate the break more accurately. If the broken wire is grounded at the ruptured end, any one of the various loop tests may be used for the purpose of locating the break. Finally, if the wire is partially grounded at the break, the problem becomes a very difficult one, and usually impossible of solution.

COMMON BATTERY SYSTEMS.—(477.)

What is the voltage of common battery systems? Can ordinary magneto apparatus be converted to work on a common battery system, and what additional apparatus is needed?
G. N. J.

Common battery systems are operated with different voltages. The Bell companies use 24 v. for local work, but sometimes resort to 48 v. for long-distance operation. This additional voltage is used, however, to operate the signals. Some of the Independent manufacturers use 48 v. for general operations, others 30 v., and some 24 v. It is impracticable to attempt to reconvert magneto instruments to operate on common battery systems for several reasons. In the first place, the primary circuit of the induction coil has too low a resistance and the transmitter has a similar trouble. Then the secondary circuit of the coil has too high a resistance for good operation; again, the circuits would have to be entirely rearranged and a condenser added. In fact, the only part of the instrument that remains the same is the ringer. When a change is made from magneto to common battery a condenser is cut in series with the bell circuit of the magneto instrument to prevent it shunting the line and causing the line signal to operate. This is only a temporary arrangement to allow the use of the old magneto instrument till it can be changed for a common battery one.

TRUNK TROUBLE.—(478.)

We have the following trouble on a long trunk line: When *A* calls *B* the circuit seems O.K.; but if *B* calls *A*, quite frequently it is impossible to carry on a conversation, and the line is very noisy; that is, it hums badly at night. What is the trouble?
A. B. C.

From your description the trouble might possibly be in the trunk calling cord of the exchange at *B*. There may be a loose connection somewhere in the cord circuit which goes open at times. This would account for the noise on the line and also for the difficulty in carrying on a conversation. Look over the cord carefully and test it for a cut out, also see that the plug is not worn too much or is dirty. Examine all the connections to the keys, and if you employ a repeating coil, go over this very carefully. An open circuit, such as you seem to have, sometimes occurs at the ringing key, and thus the trouble when *B* calls *A* can be accounted for.

OHM-METER CIRCUIT.—(479.)

Enclosed find an ohm-meter circuit for general testing. Please inform if combinations are correct for satisfactory results. If not, please correct.
J. W. N.

In reply to your query respecting ohm-meter circuits, we found it very difficult to trace the connections shown upon your drawing; therefore, in order to answer your query, we herewith reproduce in Fig. 479 an ohm-meter circuit for general connec-

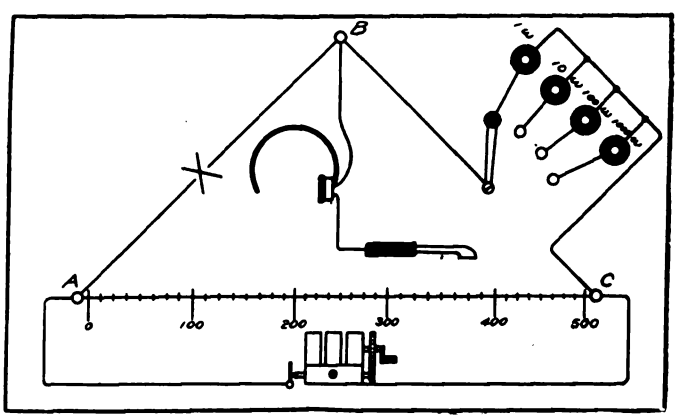

Fig. 479.

tions. If you wire up your ohm-meter in accordance therewith you will, no doubt, obtain satisfactory results.

RECEIVER ADJUSTMENT.—(480.)

Why are paper rings placed between a receiver diaphragm and the cap?
L. N.

Paper rings are used to aid in the adjustment of the receiver. In some of the old style apparatus the receiver magnets were fastened to the end of the case when the cords are attached. Quite frequently the expansion of the magnets is greater than that of the case, and consequently the diaphragm is brought too close to the magnet. The rings are used to increase the distance so as to secure the best results.

Rings are also used when the cap does not hold the diaphragm tightly; in this case they should be placed between the cap and the diaphragm. When a receiver reaches this point, necessitating the use of rings, it would be much better to take it out, as it is almost impossible to secure good results.

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IMPORTANCE OF KNOWLEDGE OF TRAFFIC CONDITIONS.

WE desire to draw the attention of the men whose duty it is to manage and superintend telephone plants to the series of articles now appearing in THE AMERICAN TELEPHONE JOURNAL upon traffic. It is safe to say that no department of telephone exchange operation requires more attention than the one termed traffic, and it is also quite true that except in the case of the larger companies there is none so little understood. The prime reason for this is perhaps to be found in the fact that its details and requirements have not been considered except in a very general way, and consequently the invaluable information which a study of the subject contains is rarely discovered, if ever thought of. Yet how important it is can be illustrated by using a railroad system as a simile. It is very certain that a general manager of a railroad system who does not apply himself to the details of the traffic will very soon find out that the system is being run on a losing basis; and that, instead of an adequate supply of cars to handle the rush periods at various hours of the day, his lines are overcrowded and his patrons discontented.

The position of the manager of a telephone system is exactly similar. He must be acquainted with the amount of business done over the various lines; he must acquaint himself with the subscribers who use the telephone lines; and he must also know just at what periods the greatest amount of business is being collectively done, so that he may adequately provide operators sufficient to handle the load, and yet arrange it so that there is no waste force. In the articles to which we refer we are giving illustrations which tend to show, under varying conditions, the distribution of the traffic of a telephone system.

When the business of a subscriber warrants the addition of more lines, this should be immediately known to the manager, because it offers additional revenue to the system. Another important point is that quite frequently a business house could use to great advantage a branch exchange. Now, the subscribers' knowledge of the business is limited, and they do not understand why it is that people so frequently complain that they were called up and told that the line was busy. Thus the business house is liable to censure the system, when this condition might have been averted had the manager posted himself upon the traffic requirements of that particular station.

Trunk lines demand that they should be worked to their maximum capacity, and yet not overloaded. This state of affairs can only be discovered through a careful study of the traffic over these lines. If, for instance, the traffic line between two points is busy but one-third of the time, it is very evident that an additional line would be a loss. Contrawise, if the trunk line is worked to its maximum capacity, and necessitates the holding up of messages on account of the lack of facilities, it is evident that a new trunk is required between the two points. The only way this can be readily determined is through a study of the trunk lines' traffic.

We do not believe that the traffic problem can be solved in a day, a week or a month. It is a constantly expanding problem, which demands constant attention; and which, unless handled with a large amount of common sense and executive ability, is liable to prove the Waterloo of any system. Therefore, to those who have the interest of the system at heart it is imperative that their knowledge should not be limited to the operation of a certain line, or to the details of the construction of the system; but it should include every detail, from the simplest arrangement to the most complicated problem of traffic.

AN IMPORTANT DEPARTMENT OF TELEPHONY.

We earnestly request that all managers give this series of articles their close attention, as we fell certain it will open up a new field and broaden ideas, which will eventually lead to the most gratifying results.

THE NECESSITIES OF A TELEPHONE PLANT.

PAGES could be written of the necessary details to be looked into and considered in the matter of exchange equipment and then not cover the field in more than a cursory manner. The part that makes it still more difficult to lay down a set of general ideas is that no two systems are similar, each and every one requiring special attention. Where party line service is given there are the details of operation to be considered, the various types of this type of apparatus on the market should all be investigated with a view to selecting the one which most nearly fits the requirements of the service. In determining the type of switchboard the probable growth of a system should be taken into consideration, so that a provision may be made for future expansion which shall allow of the additional equipment being installed with the least delay to operation of the plant and at the lowest cost.

When a plant has to be reconstructed because of lack of foresight on the part of its original designers, the cost of such work is far in excess of what would have been necessary where the engineering details had been properly worked out in the start. There is no business which insures such steady growth as a telephone system which is properly designed with a view to economy in operation and that is managed by an efficient force.

Experience has shown that unless the executive heads are men who thoroughly understand the intricacies of the business, the results will not be satisfactory. This point was strongly brought forth by Charles Russel, who said in an address before the Pennsylvania State Convention:

"There are three officials who must work in harmony—the engineer, who provides an equipment of the highest efficiency and is alert to secure for the public the best transmission, either local, toll or long distance; the superintendent of maintenance, whose duties are to keep the equipment in perfect working order, and the traffic manager, who handles the business for whom all others are providing a means for accomplishment."

These remarks cover the general ideas very thoroughly. For success everything about a telephone system must be properly designed, every detail of construction must be carried out with a view to securing the best possible results, and every person concerned in the plant's operation must be capable, and not only capable, but have a direct interest in the welfare of the company.

In summing up, the following points are evident as absolutely necessary to success: First, good apparatus and construction, for without it the best force in the world would be unable to secure results; secondly, a high grade of employees, that is, men and women who can appreciate the responsibility of their positions and who will work to show their ability; and, last but not least, harmony among all employees. With these qualities abundant, any telephone plant must succeed, and since the Independents have, as a general rule, considered all these cardinal points, there is no reason why they should not continue to enjoy the prosperity so well deserved.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

INTERFERENCE BY HOUSE MOVING.

We have several exchanges in Iowa and have been troubled a great deal by parties moving buildings through the streets in our exchange towns. In some cases they do not even notify the telephone company that they want to get through, but go ahead and get through and break down the wires. We have franchises in all the towns. What can we do to protect ourselves or have there been any Iowa decisions in this matter? N. T. Co.

WHILE there have been no Iowa decisions upon the subject, the law is well settled that house movers have no right to break down wires without making compensation to telephone companies. It was held in Northwestern Telephone Exchange Company v. Anderson (N. Dak.), 98 N. W. 706, that the franchise of the company constituted a contractual relation between the company and the city, which became a vested right that could not be impaired by subsequent action of the city licensing defendant to move a building through the streets. Said the court in Williams v. Citizens' Railway Company, 130 Ind. 71, 29 N. E. 408, 15 L. R. A. 64, 30 A. S. R. 201: "Where a right to use a street is acquired pursuant to statute and under a license from a municipality, it is in the nature of a contract right, and the municipality itself cannot destroy or materially impair it. . . . It is undoubtedly true that all such rights are subordinate to the paramount power, usually denominated the 'police power,' for that power cannot be annihilated by contract. . . . It would violate the plainest principles of law to permit an individual citizen to confiscate or destroy the property of a corporation which has assumed to exercise rights under the laws of the State, and to which the officers of the government have given recognition by granting it the use of the streets of the city. . . . The appellants in this case are not asking to be allowed to make an ordinary use of the streets of the city. They are, on the contrary, asking that they be permitted to use the streets in an extraordinary mode, and for an unusual purpose. . . . It would be strange, indeed, if large buildings could be moved along the thronged streets of a city without control or restriction, and it would be equally strange if the owner of a building could destroy the property of others in order to enable him to move his building from one place to another."

Your remedy for a violation of your right of immunity from house movers would be either an injunction to restrain interference with your wires or a suit for the damages inflicted by the interference. In N. Y. & N. J. Telegraph Co. v. Dexheimer, 14 N. J. Law J. 295, the defendant was a licensed house mover, and in moving a house cut the wires of the defendant's system. Suit was brought for damages and the jury was charged that the defendant was liable if he cut any wires that were put up and maintained in accordance with the city ordinance under which they were put up, and ordered damages assessed in plaintiff's favor for such as were thus maintained and were cut, and these only.

See also Millville Traction Co. v. Goodwin, 53 N. J. Eq. 448, 32 A. 263; Penn. Tel. Co. v. Varnau (Pa.), 15 A. 624; Day v. Green, 4 Cush. 433; Graves v. Shattuck, 35 N. H. 257, 69 A. D. 536; Townsend v. Epstein (Md.), 49 A. 629, 52 L. R. A. 409, 86 A. S. R. 441.

IMPLIED LICENSE.

A TELEPHONE company erected telephone poles along a highway without the consent of a person whose land abutted upon the highway and whose title extended to the center thereof. The land-owner permitted the telephone company to occupy the highway for some time and then attempted to force the company to remove its lines. It was held that the company's occupancy of the premises after knowledge of the entry by the land-owner was an implied license which, having been initiated by a trespass, did not confer on the telephone company an easement to maintain its poles, and as such was subject to revocation at the will of the owner of the land.

It was also held in this case that the grantor of the land-owner was entitled to maintain ejectment to oust the telephone company from the use of the highway and was not required to bring a suit in equity in which its equitable rights, if any, might be ajudicated.

Little *vs.* American Telephone and Telegraph Co. 89 N. Y. S. 136.

ENFORCEMENT OF CONTRACT.

AS part of the consideration for the release of a right of way to erect and maintain a telephone line along a public highway adjoining the premises of Oliver M. Foster and Edward E. Foster in Jackson county, Ind., Charles Leininger, the owner and operator of a telephone exchange in Seymore, Ind., agreed to place in the residences of each of the Fosters, and also of John Q. Foster, a telephone and connect same with the Seymore telephone exchange. The company was to maintain and keep in good repair said telephone for the period of five years and each of the Fosters was to pay therefor a dollar per month. It was further provided that J. Q. Foster was to erect, at his own expense, suitable telephone poles upon which to attach telephone lines from the city to his residence. Leininger failed to supply J. Q. Foster with a telephone and he brought suit for damages. In the Circuit Court a demurrer to the complaint was sustained, but the Appellate Court of Indiana refused this judgment.

One of the objections to the complaint was that it was not enforcible at the suit of the appellee because it was not averred that he had erected at his own expense poles upon which to string wires. It was argued that the erection of the poles was a condition precedent to his right to demand the placing of the telephone in his house and the connecting it with wires leading to the exchange. The Court held that this would be a correct statement of the law if appellee had performed the conditions of the contract on his part. It is a firmly established rule of law that it is unnecessary to allege performance and an offer to perform on the part of the plaintiff when it is shown that the defendant has repudiated it and denies liability under it.

Another objection of the plaintiff was that the contract upon which the complaint was based was not mutual. In this case the plaintiff was not a party to the contract and his rights, if any, exist by virtue of the fact that defendant agreed with others upon certain conditions to place a telephone in his house and connect it with the telephone exchange. The Court held that this did not change the facts for the rule of law is that a contract between two parties made for the benefit of another may be enforced by such other party although he was not privy to it and no consideration passed from him to the party bound. Neither is it necessary for the plaintiff for whose benefit the contract has been made to aver an acceptance of the contract, for this is implied by bringing a suit upon it.

Foster *vs.* Leininger (Ind.) 72 N. E. 164.

CITATIONS OMITTED.

CITATIONS were accidentally omitted in the article entitled "A Pole an Appliance, not a Place," in our number of November 26, and in the article headed "Illegal Use of a Telephone," in the issue of December 17, of this year. The case referred to in the first article is Britton v. Central Union Telephone Co., 131 Fed. 846; the other case is Godwin v. Carolina Telephone & Telegraph Co. (S. C.), 48 S. E. 636.

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IN THE OPERATING FIELD.

GOOD SHOWING OF RED RIVER VALLEY COMPANY.

THE annual meeting of the Red River Valley Telephone Company was held recently at Buxton, N. D., 200 of the 500 stockholders being present. The following officers were elected: President, T. J. Smith; vice-president, P. M. Paulson; secretary, treasurer and general manager, F. H. Hagen. Directors—T. J. Smith, S. K. Knudtson, O. J. Sorley, Theo. E. Ostlund, C. G. Thoreson, D. M. Paulson, S. H. Hagen, Lewis Thompson, Walter Christen.

The company declared a dividend of 12 per cent. and transferred a nice surplus to the reserve fund. The company has a paid-up capital of $65,000.

The company has 1,050 telephones in use among farmers and business men in Grand Forks, Traill, Steel and Nelson counties, North Dakota, and Polk county, Minn.

KINLOCH IMPROVEMENTS AT ALTON, ILL.

A SERIES of improvements which will amount to over $40,000 has been inaugurated by the Kinloch Telephone Company at Alton, Ill. Large, heavy cables will be installed that will extend all over Alton, Upper Alton, North Alton and parts of Yager Park. The latter has never been reached before by the Kinloch company. These cables are being installed in order to give more facilities for the growing business in this city. The system in Middletown will be improved by the placing of these cables in that vicinity. The entire work will take about three months to complete, states Local Manager W. H. Reed.

THE MEADVILLE (PA.) TELEPHONE COMPANY TO EXTEND ITS SYSTEM.

THE Meadville Telephone Company, which has in the past made extensive additions to its toll and long-distance service, is at present contemplating new additions which will give its subscribers a greatly increased territory. Recently connections were completed with Franklin, Oil City, Cochranton, Titusville, and Pittsburg. The circuits, both local and long-distance, are metallic and the instruments of the latest improved types.

The growth of the company's business has been very rapid, there now being 1,200 local subscribers. In addition to these, free service is given with the exchanges at Conneaut Lake and Harmonsburg, and also with about 65 farmers in the vicinity of Watson's Run, who are thus, to all intents and purposes, on the local exchange list.

NEW TELEPHONE COMPANY OF INDIANAPOLIS TO ERECT NEW BUILDING.

THE New Telephone Company, of Indianapolis, Ind., has recently ordered plans prepared for a new exchange building to occupy the present site in Meridian street. The specifications call for the erection of a fireproof structure to cover the entire lot, 50x195 feet. The building will be erected in two parts; the first to be four stories high, and will be utilized for the switchboard and auxiliary apparatus. When completed a large amount of new equipment will be installed to take care of the phenomenal growth of the company's business. The old building will then be torn down and an eight-story structure erected, which will contain the offices of the company and operators' quarters, such as dining hall and rest room.

This company has enjoyed an extraordinary growth during the past year, having added since January 1,856 telephones to the list. To accommodate this increased patronage the company has had to enlarge the capacity of tne switchboard 25 per cent.

S. P. Sherrin, the president of the company, states that there are 166,000 Independent telephones in Indiana, and that of these 84,000 are within a radius of fifty miles of Indianapolis.

HOME COMPANY, OF RICHMOND, IND., GIVES FREE TOLL SERVICE.

THE Home Telephone Company, of Richmond, Ind., upon the completion of its new switchboards recently, gave its subscribers free long-distance telephone service over the U. S. Telephone Company's lines in its Ohio territory. The above territory includes practically all of Ohio and parts of Michigan, Pennsylvania and West Virginia. The company has just installed new and up-to-date toll swithboards and now has entirely separate apartments for its long-distance business. The boards installed are the latest and best type and place the company in excellent position to take care of its long-distance business, as neither money nor time was spared in its effort to make its toll system as perfect as possible. Work is now in progress on additional copper toll lines between Richmond and Indianapolis which will materially improve the service and facilitate prompt handling of toll business going west.

TO TELEPHONE FROM MOVING TRAINS.

IT is reported Aloysius S. Peshong, of Dunkirk, N. Y., has practically completed a system of telephoning from moving trains. He says by his method it is possible for a man to step to the end of a moving car and converse with his family as though in his office in the city. He also says trains can be dispatched as safely by his invention as by telegraph. Among the other advantages Mr. Peshong claims his system will have over the telegraph is the fact that the train dispatcher can carry on a conversation at any time with the engineer, and knows exactly what time he is making between stations and could figure accordingly in case of a breakdown to the locomotive or train. He is confident that the railroads will adopt the new system and declares that wrecks on single track road in the future will be reduced to a minimum.

NEW U. S. CIRCUITS.

THE United States Telephone Company is making great headway with the construction of its new lines in Ohio. These circuits are being put up in the most approved manner and consist of heavy copper lines which will be able to handle the business under the most exacting conditions. New lines are being built from Columbus to Toledo and to Plain City and Marysville, which will greatly aid the growing demands of the system.

CONNECTING LINES OF CITIZENS' COMPANY, OF ST. JOSEPH, MO.

THE connecting toll lines of the Citizens' Telephone Company at St. Joseph, Mo., now connect with towns and cities all over Ohio, Indiana, Kentucky, Illinois, Kansas, Iowa, Nebraska, Missouri and some places in Michigan.

New toll lines are being extended into Oklahoma, Indian Territory and Arkansas, on the south and southwest. The latter lines will be giving service in about ninety days; and in about

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sixty days connections will be made with Sioux City, Iowa; Sioux Falls, S. D.; St. Paul and Minneapolis, Minn., and the hundreds of intermediate towns and cities.

The company has recently been connected with Lincoln and South Omaha, Neb., together with cities and towns in the vicinity of the two latter places.

The Citizens' Telephone Company is stringing new cables into the suburbs of the city, and will continue to do so until the entire city is practically covered. During the next ten or twelve months they will put into use sufficient cable to accommodate from 3,000 to 3,500 patrons, in addition to those they now have.

Besides the city lines it has several hundreds of farmer and country town subscribers, to whom the city subscribers can talk free.

ANOTHER INDEPENDENT STATEMENT.

THE New Ottawa Telephone Company, which operates a system in the town of Elmore, Ohio, has recently issued a comparative statement for the years 1903 and 1904, which is given herewith.

Attention is drawn to the rate of interest paid on dividends,

COMPARATIVE STATEMENT, NEW OTTAWA TELEPHONE COMPANY, FOR 1903 AND 1904.

	For year ending Nov. 1, 1903.	For year ending Nov. 1, 1904.
Gross receipts	$20,706.92	$23,973.67
Expenses	8,981.72	10,806.80
7 per cent. dividend....	8,680.00	8,680.00
Surplus	3,045.20	4,486.87
Net increase	.....	1,441.67

which compares favorably with any paid by the Bell companies. Another noteworthy feature is the amount carried to surplus, which is nearly 50 per cent. greater than for the preceding year.

In view of the fact that the Bell Company has contended that Independent securities were not on a paying basis, this report is timely inasmuch as it tends to refute that statement.

MARYLAND'S LONG-DISTANCE CONNECTION.

THE Maryland Telephone Company will open its Western connections January 4. With these connections completed the Maryland will become a part of a great telephone system covering practically all the Middle Atlantic States and reaching to the West as far as St. Louis and Chicago. Through its connections with the Keystone Telephone Company, of Philadelphia, and other Independent lines ramifying lower Pennsylvania and its connections with Western Maryland Independent companies, the Maryland now has the neighborhood around Baltimore pretty well covered.

Mayor Timanus will be invited to open the Western lines and will speak to the mayors of St. Louis and Chicago to celebrate the opening. Members of the city council, the city and State government, and prominent bankers and business men who have helped to make the Maryland Telephone Company a success will be invited to attend the opening ceremonies and then to partake of the luncheon which will follow.

A NEW FIRE-ALARM SYSTEM.

W. L. DENIO, of Rochester, N. Y., is now demonstrating a new fire-alarm system, which operates over the regular telephone wires either automatically or when rung in by the person discovering a blaze.

A company for the manufacture of the apparatus will be formed within a week or two by H. F. Atkinson, Mr. Denio, C. M. Henderson, B. B. Clark and Frank Bouton, who are interested in the device.

The apparatus consists of a signal box, which is placed near the telephone and connected with the regular telephone wires. From this signal box wires will lead to any part of the building or office desired with thermostats placed at stated intervals, all on the same circuit. These thermostats are so constructed that at the moment they are subjected to more than 150 degrees of heat they collapse, a stout spring drawing a copper bar against the circuit wires, thus allowing a current to pass through, which releases a spring in the signal box and sets the machinery in motion.

Connection is thus made with the central telephone office, the operator being warned of the fire by a series of intermittent flashes of the electric light. This warning of fire cannot be mistaken for anything else, as the operator is able to hear the mechanism of the signal box as it whirrs out its signal.

The system apparently guards against every possible accident. As long as the telephone wires are in working order an alarm is bound to be sent in. The same result is obtained when the telephone is in use, when the receiver is left off the hook or when one of the telephone wires is cut. As long as there is one wire connecting the telephone with the central exchange an alarm will be sent in the moment the flames touch any one of the thermostats.

HULL MUNICIPAL SYSTEM OPENED.

THE Municipal Telephone system of Hull, England, has recently been opened. The system was originally designed for 2,000 lines, but so many subscribers have been secured that it is probable an extension to the switchboard will have to be made in the near future. The plant was designed by Mr. A. R. Bennett, who also has charge of the municipal system in Glasgow, Scotland. Underground distribution to the extent of about 19 miles has been employed. It is noteworthy to remark that the largest cable is reported to contain over six hundred wires. Provision has been made for interconnection with the National Telephone Company's system, there being 120 trunks now employed. Additional connections have been provided for the long-distance lines of the Port-Office Department.

The switchboard was made by the Ericsson Bell Company, of London, and resembles the American type of common battery board.

The rates for service will be, £6 6s. ($30) for business unlimited; £5 ($24) for residence unlimited, and a sliding scale for message rate service.

NEW L. D. CONNECTIONS OF PITTSBURG AND ALLEGHENY.

THE Pittsburg & Allegheny Telephone Company is making rapid progress in the construction of its line from Pittsburg to Butler, a distance of about thirty miles. At Butler the Pittsburg line will connect with the lines of the People's Telephone Company, which has over 1,000 local subscribers. The connection when completed will put the Pittsburg subscribers in close touch with residents of Butler, Kittanning and several other smaller towns north of Pittsburg.

The Pittsburg and Allegheny Telephone Company expects to have its line to Wheeling completed by Christmas time, and also its long line to the West in the best working order. Extra care is being taken in the construction of this line, and very heavy No. 6 and No. 8 copper wire is being strung on the best poles procurable. Through its Wheeling connection the P. & A. company will be able to put its local subscribers in direct connection with Columbus and Dayton, O.; Richmond and Indianapolis, Ind.; and Kansas City and St. Louis, Mo. All these cities have large exchanges and by the through service to the West the value of the P. & A. service to Pittsburgers will be greatly increased.

CHICAGO TELEPHONE COMPANY AGAIN.

IN an opinion on the telephone ordinance of 1899, Corporation Counsel Tolman has ruled that the Chicago Telephone Company shall pay the city 3 per cent. of its receipts from its telephones in the territory annexed after the passage of the ordinance. Between $300,000 and $500,000 is involved. He also held that the company has no right to charge tolls within the city limits, and that the city can compel the company to inclose public telephones in boxes or booths.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

A STREET TELEPHONE PAY STATION.

THE Controller Company of America has recently devised a new coin telephone set, which is shown in the accompanying illustration. It is styled the No. 7 combination, and consists of a cast-iron pedestal, which bolts to the sidewalk or to a bed stone laid flush with the pavement, upon which is mounted a controller encased in an iron box having a self-closing door. The service wires may either drop from the pole and enter the box through a water-excluding gooseneck or may enter from underground through the pedestal. Space does not permit us to discuss at length the possibilities of this method of giving telephone service, except to say that it meets the necessities of a class of pay-station service that has not heretofore been developed.

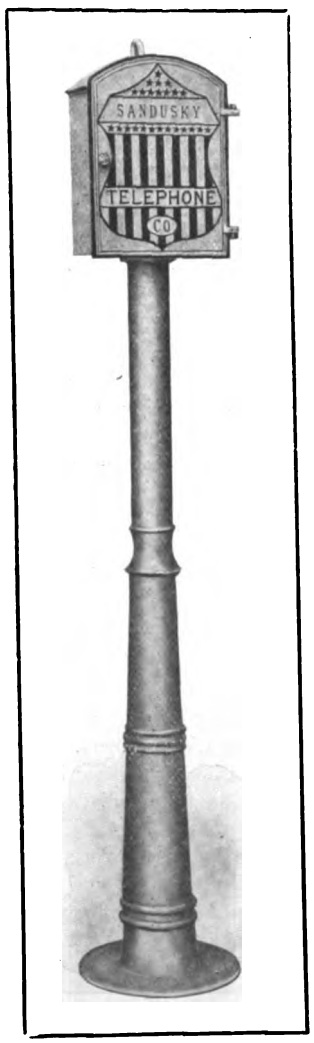

Fig. 1. Controller Co.'s Street Pay Station.

The reason for this new development is obvious from the fact that no apparatus had been specially devised which would be able to fill the various requirements of pay-station service operating under these conditions.

In conjunction with the fire and police service of a city, telephone companies should find no trouble in having the fire and police ordinances so amended as to include this form of communication. By referring to the illustrations a general idea of its practical design can be obtained. Fig. 1 shows the box closed. The design on the front of the door is striking enough to draw instant attention to the fact that it is an Independent pay station and should therefore form an excellent advertisement for a company. At railroad stations the instruments could be placed at any convenient point on the platform and thus be within instant reach of the traveling public. In cases where no arrangement can be made with the railroad company for their installation at the stations, these pay stations could be placed at some conspicuous point near by.

The Controller Company of America is preparing to issue bulletin No. 7, which will very thoroughly describe this type of apparatus and its possibilities from every standpoint. To parties interested the company will be pleased to supply all information, including the preceding bulletins already issued, which describe its telephone apparatus for measured service.

COOK APPARATUS.

ONE of the most novel and interesting advertisements in our last issue was that of Frank B. Cook. The advertisement told, without a word of descriptive matter, a most comprehensive and interesting story of the line of protective apparatus and construction material which Cook makes. It was a surprise to most exchange managers, for there are many who did not realize how complete Cook's line is.

In the advertisement the artist has shown a complete system of protectors, from the central station apparatus to the protector for the subscriber's instrument.

Back of the switchboard is shown a diagram of Cook's well-known No. 444 protector for the central station, the feature of this protector being the self-soldering heat coils. Cook's patented test plug is also shown. Cook has sold about 70,000 pairs of this type of protector in the last six months.

The cable leads out from the central station protector to the office pole. Following it, one's attention is next attracted to the Marlin cable hangers, also handled by Cook. Crossing to the pole which is the pole at the outermost end of the cable, Cook's type S. A. pole cable terminal is shown. From here the jumper wires lead to the cross-arm and are there distributed to the glass insulators.

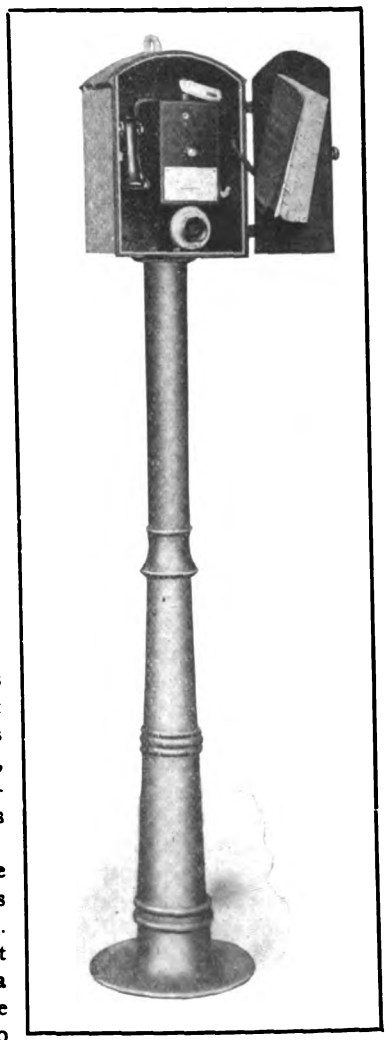

Fig. 2. Showing Interior of Controller Co.'s Street Pay Station.

One drop from the cross-arm leads to the subscriber's instrument, which is protected by one of Cook's type 12-A subscriber's station protectors. Another drop leads to a building, outside of which are shown two different types of Cook's tubular line fuses.

The pole is guyed with a hevy stranded cable, on which is used one of Cook's universal guy clamps. It appears that Cook has passed this way recently, for his card is seen hanging from one of the steps on the pole.

The cross-arms on the pole are supported by Cook's tubular cross-arm braces. On a pair of line wires at the office pole is shown a transposition in which are used two of Cook's Type 00 test connectors. On one of the line wires at this pole is also shown a sleeve connector for making a splice in the wire, this also being handled by Cook.

THE MOUNTAIN STATE ELECTRICAL COMPANY, Wheeling, W. Va., has recently received orders from some of the largest telephone companies for its Hall type D cable terminal with distributing ring. This terminal has been specially designed for underground installations and possesses some features not found in others. Each pair is provided with absolute lightning protection and is mounted on a hard rubber strip. Cross connections can be easily made and the wires neatly arranged in a better way

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

EXCEPTIONAL offer—I have a three-fourths interest in a telephone stock company owning four good exchanges and 1,000 miles of toll and farmer lines. About 1,000 telephones in operation and sufficient territory for that many more. Stock outstanding amounts to $50,000. Has earned over 30 per cent. in past two years. No competition; $25,000 cash and balance long time; low rate. Address Box 291, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 291

FOR SALE—New telephone exchange, situated in Alabama. Long-distance connections; 50 telephones; two and three-dollar rate. Good reason for selling. Will bear the closest investigation. Address Box 302, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 302

FOR SALE—Telephone lease records. Every manager should get one now and keep his accounts correctly and easily during 1905. ELEC'L PUB. & SUPPLY CO., Chicago, Ill. 303

WANTED

Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—Position as manager with a first-class company looking for a hustler. Experienced particularly in toll and long distance work, including clearing house methods, and line construction. Familiar with every detail of telephone work. Executive ability; excellent references. Address Box 285, care THE AMERICAN TELEPHONE JOURNAL, New York. 285

WANTED—Telephone salesman. One familiar with exchange material as well as interior systems. Address Box 299, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 299

POSITION wanted by switchboard expert, with twelve years' experience. References given. Address Box 300, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York. 300

WANTED—Position with company capitalized at from fifteen to twenty-five thousand dollars, to take charge of exchange or superintend construction. Experienced in all lines. Address Box 301, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 301

WANTED, POSITION—17 years' experience, covering all departments telephone service; past 4, as foreman building and equipping exchanges, rural and toll lines. Age, 41. Temperate. Moderate salary. A 1 references. Address Box 304, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 304

Cross-Arm Braces

PLAIN BLACK
JAPANNED
GALVANIZED

We are manufacturers and carry a complete assortment of all sizes in stock, and can make prompt shipments.

BUFFALO STEEL CO.

TONAWANDA, N. Y.

At least a carload of

TELEPHONE SUPPLIES

leaves our factory every day. Some days more than a carload; maybe two, or three. This gives an idea of the volume of our business. The reasons:

OUR SUPPLIES ARE THE BEST
OUR PRICES THE LOWEST
OUR DELIVERIES THE PROMPTEST

We make all line supplies in our own factory by machinery. We buy the rough material in quantities, securing special discount. We ship all orders direct from stock. Write us your specifications and see what we can do for you.

HUBBARD & CO.

Murtland Building **Pittsburgh, Pa.**

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than is possible with others. The can top is designed to offer the best protection against dampness and rain, and is mechanically perfect.

NEW PROTECTIVE AND CROSS CONNECTING APPARATUS.

THE Swedish-American Telephone Company has recently put on the market a new protective and cross connecting equipment that is meeting with the general approval of all telephone men, judging from the heavy demand that there has been for it. There has always been an urgent need for good equipment of this character. The Swedish-American Telephone Company has gone forward another notch in the art of telephony in designing this new apparatus.

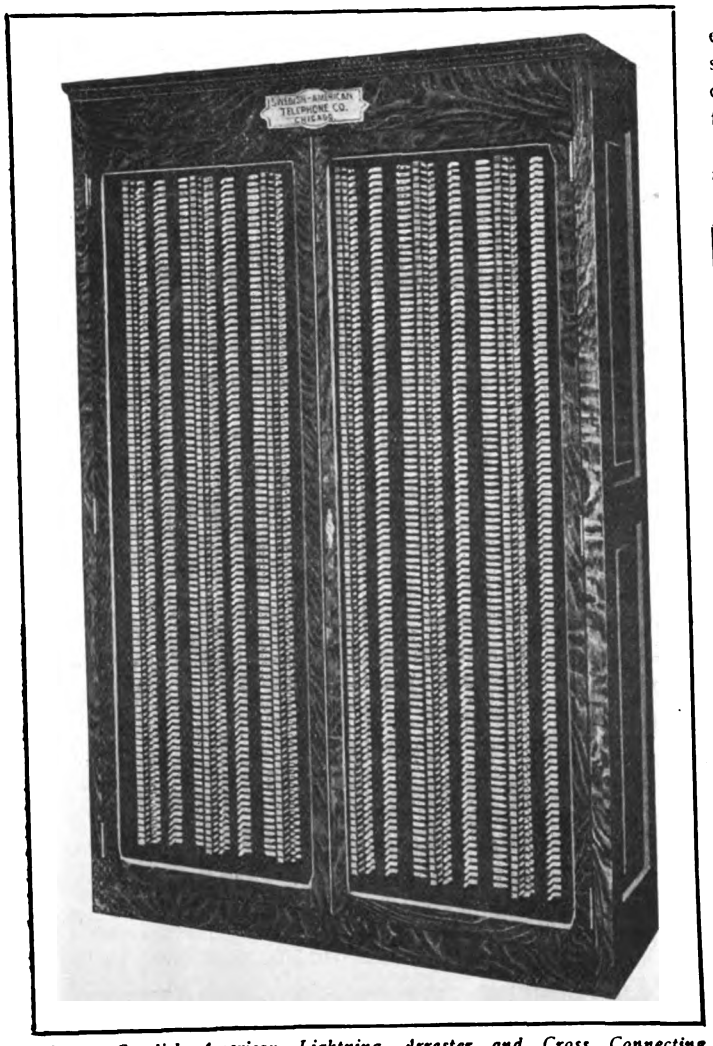

Fig. 1. Swedish American Lightning Arrester and Cross Connecting Cabinet.

Fig. 1 represents a combination carbon and fuse lightning arrester and cross connecting cabinet with a capacity of 300 metallic lines. The lightning arresters and cross connecting clips are mounted on three-ply, thoroughly seasoned maple strips, each strip having a capacity of 100 single lines. The boards are so arranged that all the cross connecting is done in the back, and is consequently hid from the front view. They are mounted in a highly finished quarter-sawed cabinet, as illustrated. The cabinets are furnished in three different sizes, 300, 200 and 100 metallic lines. It is not necessary to get the cabinet complete to its full capacity, as an additional strip can always be mounted in the cabinet as needed.

Fig. 2 shows the method of connecting metallic and grounded lines and also gives dimensions of board. This equipment adds materially to the appearance of central offices, as well as providing a simple, inexpensive method of protection and an accurate record of the different cable lines, each strip being numbered in such a way as to enable one to instantly locate the line desired and make the cross connections in a thorough and complete manner. Heretofore cross connecting wires have generally been seen on the front side of the board where the clips were mounted, and in a number of cases they have been the cause of confusion and mistakes.

The above described lightning arrester and cross connecting equipment has the features of being very compact and at the same time simple and easy to work on. By opening the cross door of the cabinet the operator can instantly find a certain line fuse, thereby saving considerable time in locating trouble.

The carbons in the lighting arrester are of a grooved pattern and easy to remove and replace. The little clips holding the line fuses are arranged so as to create a strong tension, thereby pro-

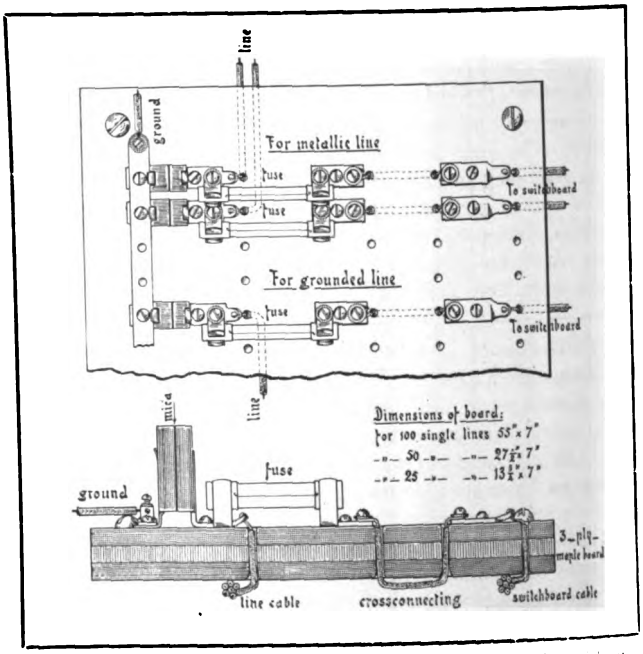

Fig. 2. Circuits for Cross Connecting in Swedish American Cabinet.

viding a good contact. They are made from strong German silver and will not lessen their tension. The clips holding the fuses are slightly bent, thereby giving the fuses an inclined position, which will prevent dust from settling on the fuses.

Other particulars and prices will be gladly furnished on application to the Swedish-American Company.

FRANK B. COOK, of Chicago, Ill., has recently had three decisions rendered in his favor by the United States Patent Office in interference case No. 23,636, Cook vs. Kaisling, relative to a self-soldering heat coil. July 25, 1904, the department denied Kaisling's motion on leave to amend his preliminary statement. August 11, 1904, the department, upon a rehearing, again denied Kaisling's motion on leave to amend his preliminary statement. August 12, 1904, decision was rendered denying Kaisling's motion to dissolve the interference on the ground that Cook had no right

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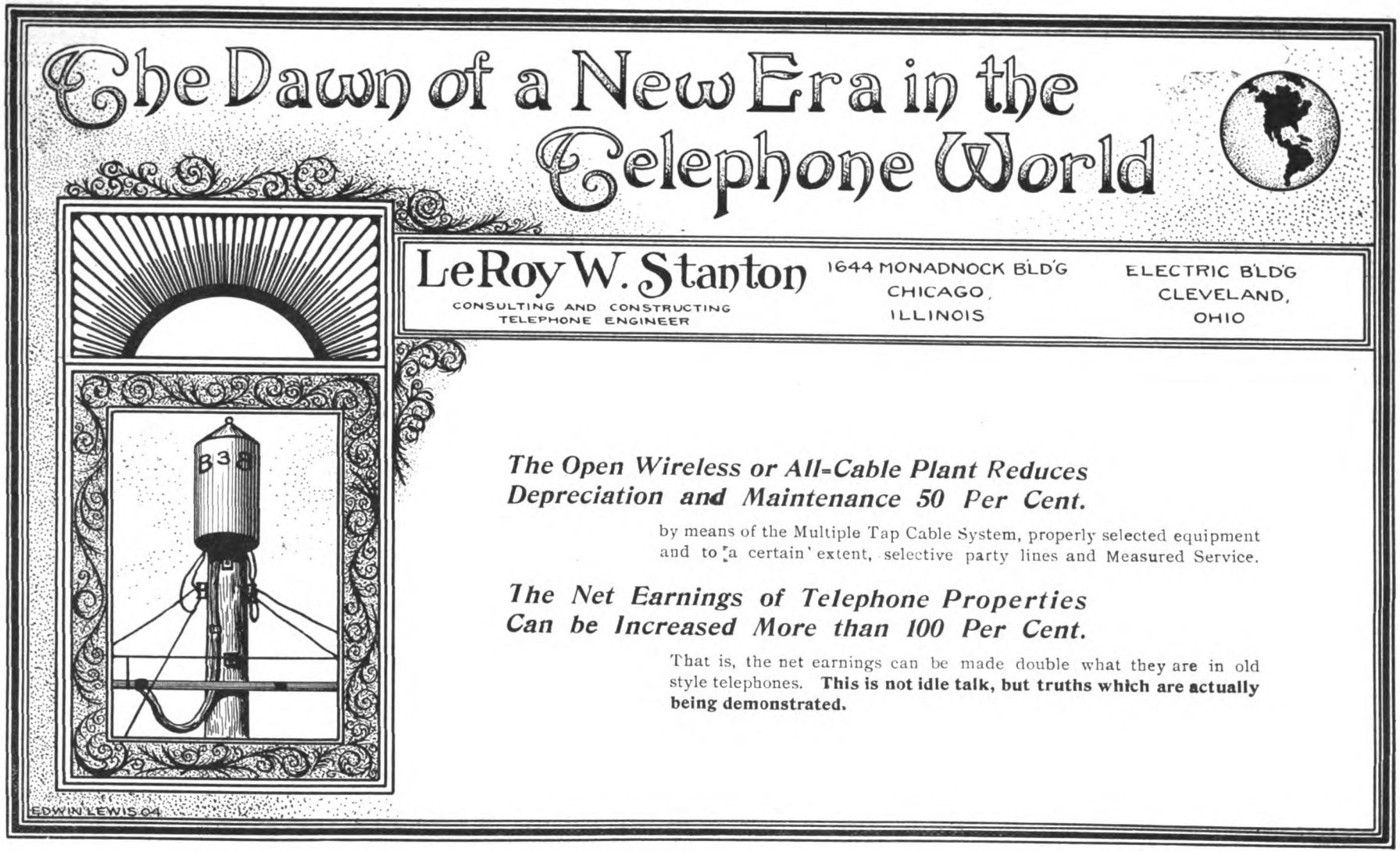
FREE TO YOU—Send Postal For It

This is the cover page of a booklet illustrating and describing some of the work I am doing. The remaining pages will appear in this space from week to week. The booklet itself, printed in two colors on heavy plate paper, will be sent free to anyone interested.



"Money Saved is Money Earned"

I have saved others money; given the opportunity, I can do the same for you. — LEROY W. STANTON.

ELECTRIC BUILDING, CLEVELAND, OHIO. MONADNOCK BUILDING, CHICAGO, ILL.

Please Mention the AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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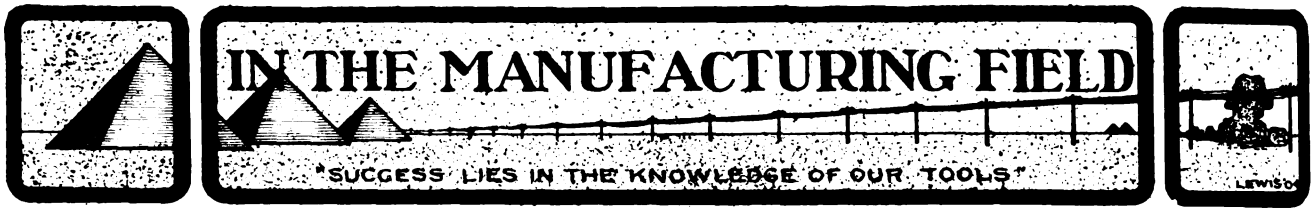
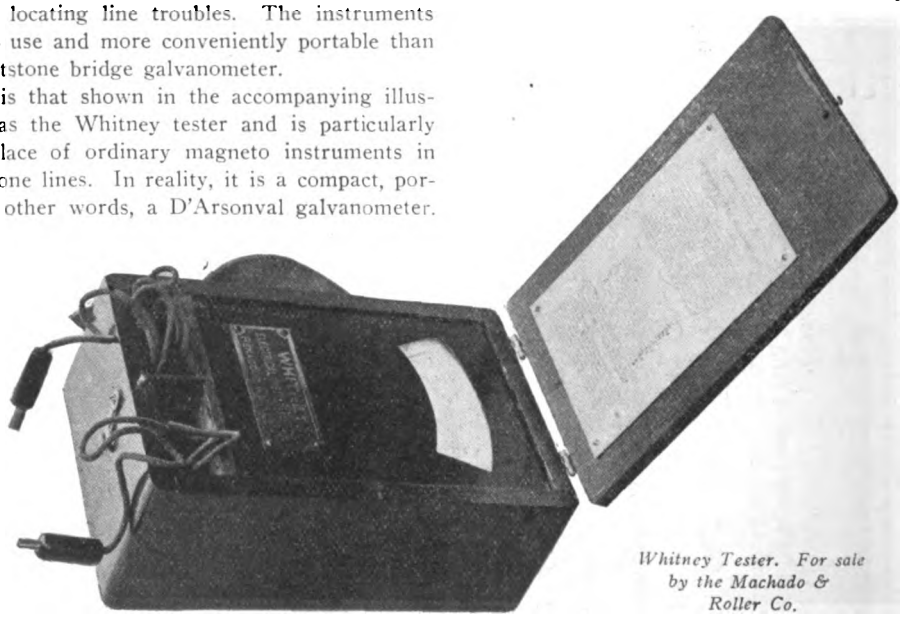


to make the claim, the examiner deciding that Cook alone was entitled to the claim in interference. Limit of appeal expired September 1, and as no appeal was taken, the subject matter defined in the issue remains in Cook's application and must be erased from Kaisling's.

A NEW TESTING INSTRUMENT.

THE Machado & Roller Company, of 203 Broadway, New York, selling agents of the Whitney Electrical Instrument Co., has recently issued an interesting and descriptive catalogue relating to electrical measuring instruments, many of which will be found of considerable utility in telephone work. The catalogue chiefly deals with the various forms of voltmeters and ammeters, embracing all ranges of this form of measuring instrument from the milli-voltmeters and the milli-ammeters, reading to one thousandth of a volt and one thousandth of an ampere respectively, to large central station instruments capable of registering great quantities of current and high pressures. A notable feature of the catalogue is a description of the new forms of the Sage ohmmeter, which telephone linemen will find particularly convenient in locating line troubles. The instruments are much more easy to use and more conveniently portable than any form of the Wheatstone bridge galvanometer.

A novel instrument is that shown in the accompanying illustration. It is known as the Whitney tester and is particularly adapted to take the place of ordinary magneto instruments in making tests on telephone lines. In reality, it is a compact, portable voltmeter, or, in other words, a D'Arsonval galvanometer. It is arranged so that it may be carried either in the pocket or slung over the shoulder. It measures 7½ x 4¾ x 3 inches and weighs about four pounds. These instruments for testing purposes are wound from 5,000 to 25,000 ohms, and are correspondingly sensitive. Each instrument is accompanied by a pair of small dry cells and an adjustable rheostat. The terminals are so arranged that they may be easily used in making any of the well-known resistance measurements.



Whitney Tester. For sale by the Machado & Roller Co.

TELEPHONES FOR SOUTH AMERICA.

THE Monarch Telephone Mfg. Co., of Chicago, has just closed an order for two hundred telephones and a large amount of construction material, as well as telephone and switchboard parts, to be shipped to Guayaquil, Ecuador. The instruments are the standard Monarch No. 30 series sets, equipped with the latest devices of the Monarch Company. The company at Guayaquil has succeeded in building up a good business and reports that the native South Americans are enthusiastic users of the telephone, as they can thus talk most outrageously to their worst enemies and still feel moderately sure that a stiletto will not come into play the next instant. The Monarch Company guaranteed that their transmitters would transmit any speech, no matter what the language might be or how it was spoken. Shipment of the apparatus were made about December 20, and the goods will then arrive in Guayaquil about February 5, 1905.

THE GEMMILL TELEPHONE AND MFG. CO., Orrville, Ohio, is manufacturing a "reversed" solid back transmitter, that is meeting with unqualified success. This transmitter is built upon lines which insure the greatest volume of sound without loss of clearness and quality of tone. Its mechanical construction is as nearly perfect as it is possible to be made and leaves nothing to be desired. This firm also manufactures express and toll line switchboards of any capacity, and a party line telephone which is well called the Sampson, on account of the strength of its magneto generator, which makes it one of the best instruments for rural line service so far devised. Central energy apparatus to meet the most exacting requirements has been designed, and so well has it been received that orders from every part of the country are being constantly received. The company believes that it has the most practical apparatus on the market to-day, and therefore hopes to hear from every reader of this paper. Prices and all other information will be furnished upon request.

THE HADLEY WILLIAMS COMPANY, of Pittsburg, Pa., is placing on the market two new devices for telephone users which are unique. One of them is termed a muffler and consists of a cap which fits over the mouthpiece of a transmitter. Its use is to prevent dust getting in and also to prevent any sound being conveyed over the line that is not desirable when the receiver is off the hook. The other novelty consists of a spring wire clip to hold the receiver when it is desired to call a party to the telephone. This clip fastens over the transmitter and forms a secure holding place for the receiver, thus preventing the wear upon the cords which occurs when the receiver is allowed to hang down. The company will be pleased to furnish further information and prices upon request.

THE CHICAGO WRITING MACHINE COMPANY, Chicago, has recently doubled its manufacturing plant. It has added considerable new machinery, including a full complement of new adjustaphone tools, dies, etc., and the company takes pleasure in announcing that it is now prepared to handle orders of any magnitude quickly and satisfactorily.

The phenomenal sale of this apparatus, and the universal approval and satisfaction that it has met with by telephone companies throughout the country, indicate that the adjustaphone is a most profitable investment. The manufacturers claim that this apparatus has long since passed the experimental stage, and although only a little over a year on the market, has been standardized and adopted by thousands of telephone companies in the United States, Canada and Europe.

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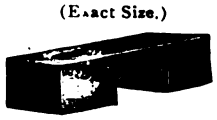

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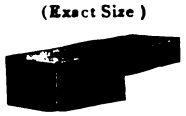

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last forever—never break or split. They are easy to install. When ordering specify color : red, gray or black.

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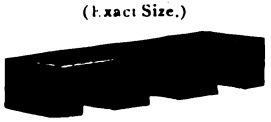

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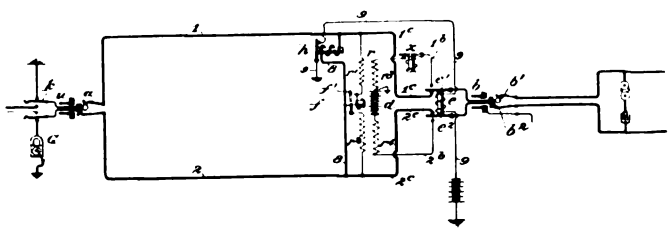
TELEPHONE PATENTS

RINGING CIRCUIT FOR TELEPHONE TRUNK LINES.

E. H. Smythe, of Freeport, Ill., patents (No. 774,283) an improved ringing circuit for telephone trunk lines and assigns to the Western Electric Company, of Chicago, Ill.

The object of this invention is to provide a ringing circuit whereby the A operator upon a trunk line or toll line is enabled to ring the subscriber without the intervention of the B operator. The essential features of this circuit are shown in the accompanying illustration. The ringing generator *G* is connected with the trunk line by a ringing key *k* and plug *u* inserted in the spring jack *a* of the trunk line. At the other end a repeating coil *r* di-



vides the line, the windings *r'* and *r2* being connected with the trunk line conductors *1* and *2*. The windings *r3* and *r4* are connected with the conductors *1b* and *2b*, which lead through the normally closed contacts of an electromagnetic switch *e* to the tip and ring of the plug *b*. Battery *d* is in a bridge between the windings *r3* and *r4*, and windings *r'* and *r²* can be connected by contact *f'* of relay *f*. Relay *h* is permanently connected in a bridge *8* of conductors *1 2* and must have sufficient impedance so that it will not shunt the talking currents, but is adapted to respond to ringing current. When excited this relay closes circuit *9* from battery *d* through magnet of electromagnetic switch *e* which has two armatures *e'* and *e2* connected to tip and ring of contacts *b'* and *b²*. Normally these are in contact with the extension of conductors *1b* and *2b* leading from the windings *r3* and *r4* of the repeating coil. When the magnet of the switch is excited by closing local circuit *9* by the relay *h* the armatures *e'* and *e2* are closed as shown cutting off the battery and repeating coil and connecting contacts *b'* and *b2* to the extension *1c* and *2c* of the trunk conductor *1* and *2*, thus a through conductive circuit is provided from one end of the trunk line to the other, independent of the repeating coil, and then the A operator may ring the distant subscriber in the usual manner, being provided with any desired form of ringing key or ringing current.

SUBSTATION SIGNAL SYSTEM.

J. W. Fouche, Ryan, Va., patents (No. 774,059) a substation signal system, and assigns two-thirds to H. B. Hutchison and C. A. Hutchison. The object of this invention is to provide an improved signal for telephone substations. The inventor provides an electromagnet which carries a vibrating armature. This electromagnet is sensitive to alternating currents, and if actuated thereby, its armature is thrown into vibrations in a manner similar to the ordinary vibrating bell. This armature carries contacts which are in circuit with the local battery and so arranged as to act as a pole changer, and consequently the device may be used to operate a signal that is actuated by direct current in any of the usual ways.

ADJUSTABLE SUPPORT FOR TELEPHONE RECEIVERS.

G. W. Sebastian, of Ashland, Ky., patents (No. 775,254) an improved support for telephone receivers, and assigns one-half to J. Leicht, of Ashland, Ky. The object of this invention is to provide a support for a telephone receiver so that it may be secured in some fixed position with reference to the transmitter in such a way as to suit the ear of the one using the telephone. The inventor provides a rod which, by means of a clamp at its lower end, may be secured to any portion of the telephone set. The upper end of the rod carries another clamp for the purpose of holding the receiver. These clamps are adjustable, so that the receiver may be fixed in any desired position.

PARTY LINE TELEPHONE SYSTEM.

C. Vollmer, of Winsted, Minn., patents (No. 774,543) an improved party line system. The object of this invention is to provide an improved party line telephone system in which any subscriber may call any other subscriber on the line without notifying any other station and to provide a busy signal which shall indicate to all other stations that the line is in use.

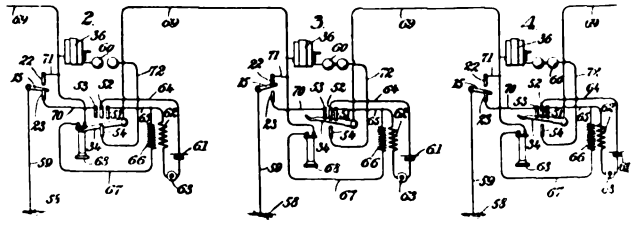
The invention is a complicated one employing a clock-work mechanism for operating the various contacts at each substation, and cannot be adequately described in an abstract. Those interested are recommended to secure a copy of the original patent.

AN ATTACHMENT FOR PARTY LINE SYSTEMS.

W. A. Shackleford, of Lexington, Ga., patents (No. 774,608) an improved attachment for party line systems. The object of this invention is to produce an attachment for party line substations whereby any subscriber other than those engaged in conversation is prevented from hearing the conversation between those using the line; and to enable any pair out of several stations that possibly may be connected to converse independent of all others, and secure from interruption.

In the accompanying illustration the circuit is shown, three stations, numbers *2*, *3* and *4*, being represented, numbers *2* and *4* being assumed to be in conversation.

The attachment consists of a pair of contacts *22* and *23*, a lever *15*; the drawing shows a grounded circuit, but a metallic line may be substituted for the ground without changing results. To make a call, any subscriber actuates his magneto *36*, sending current over line *69*, switch hook *34*, contact *54*, conductor *72*, bell *60*, generator *36*, conductor *69* to the station, and in that station through a similar circuit. Suppose No. *4* calls No. *3*, and *3* has answered; after No. *3* removes the receiver No. *4* would force lever *15* upwards and complete circuit from No. *2* through wire *71*, contact *22*, lever *15*, conductor *59* to ground. The talking circuit is now complete between the two stations but no further, and is from ground *58* at station *4* through *59*, lever



15, contact *23*, wire *70*, switch hook *34*, contact *51*, conductor *65*, secondary *66*, conductor *67*, receiver *68*, conductor *69* to station *3*, switch hook *34* at this station to contact *51*, conductor *65*, secondary *66*, conductor *67*, receiver *68*, conductor *71*, contact *22*, lever *15*, ground wire *59* and return. The stations *3* and *4* are thus connected and the others excluded. If two other stations, say *2* and *4*, are talking, and No. *3* removes his receiver, the circuit through No. *4* would be grounded, and therefore the conversation interrupted and the parties notified thereof.

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THE WEEK'S MESSAGES

FINANCIAL.

CHICAGO, ILL.—The directors of the Strowger Automatic Telephone Exchange have declared a dividend of 50 cents a share, payable on January 2, to stock of record of December 22.

UNIONVILLE, IND.—The Unionville Telephone Co. has increased its capital stock from $1,300 to $13,000.

FRANCHISES.

OCEAN PARK, CAL.—The City Council has granted Louis Blankenhorn a franchise for the Home Telephone Co.

KINGSTON, ONT., CAN.—The City Council has granted the Kingston Telephone Co. a five-years' franchise. The company will erect a $30,000 building.

OTTAWA, CAN.—Application will be made under the name of the Northwestern Telephone Co. to construct and operate telephone lines throughout Ontario, Manitoba and the Northwest Territory in the Dominion of Canada.

GOWRIE, IA.—J. F. Nordin has been granted permission to erect and maintain poles and lines in the town of Guthrie.

CULIACAN, MEX.—Oscar Braniff, of the City of Mexico, has applied for a franchise to put in a telephone system at this place.

VENTNOR, N. J.—The City Council of Ventnor City has granted to the Atlantic Coast Telephone Co. a franchise to erect poles and string lines in the streets for telephone service.

NIAGARA FALLS, N. Y.—The Niagara Co. Home Telephone Co. has made application to the Common Council of North Tonawanda for a franchise to distribute electricity for lighting, heating and power purposes. They will use their own pole lines for the distributing cables.

SPOKANE, WASH.—Charles E. Sumner, representing the Empire Electric Co., of Toledo, O., has applied for a thirty-five-year franchise and, if granted, will install a system costing $300,000.

WESTON, W. VA.—The Peoples Telephone Co. has applied for a franchise in this city.

ELECTIONS.

WINDSOR, ONT., CAN.—The Ontario Independent Telephone Co., at a recent meeting, organized with the following officers: President, John H. Connelly; vice-president, James H. McRae; treasurer, F. J. Lawrence; secretary, A. D. Prosser; general manager, C. W. Taylor; assistant general manager, P. T. Shesley. The directorate consists of the foregoing officers and J. R. Brooks and Mayor Brault, of Amherstburg. The company will install an automatic exchange system and will commence work immediately on its lines throughout Essex county, beginning at Amherstburg. Over 400 subscribers have already been secured.

MIAMI, FLA.—The Miami Telephone Co. has elected the following officers: G. C. Frissell, president; H. C. McCown, secretary and treasurer.

BLOOMINGTON, ILL.—The McLean County Telephone Co. has elected the following officers: F. Y. Gamilton, president; W. H. Johnson, vice-president; Henry Thobro, vice-president; George Burr, treasurer; E. C. Martens, manager. A dividend of 7 per cent. was declared.

CARLISLE, IND.—The Carlisle Co-Operative Telephone Co. has elected the following directors: Claude A. Ellis, John Whipps, and Thomas B. Hart.

FORT WAYNE, IND.—At the annual meeting of the Home Telephone Co. the following officers were elected: President, Charles S. Bash; vice-president, John B. Reuss; secretary and manager, William L. Moellering.

GRINNELL, IA.—At a recent meeting of the stockholders of the Interior Telephone Co. the following board of directors was elected: J. F. Wilson, W. S. Hendrixon, E. A. Marsh, J. P. Lyman, C. W. H. Beyer, M. Rew and C. R. Clark. After the stockholders' meeting was adjourned the board of directors met and elected the following officers: President, E. A. Marsh; vice-president, J. F. Wilson; secretary, W. S. Hendrixson; treasurer, C. W. H. Beyer. The plant is in first class condition and the company has made extensions during the present year to the value of $2,000. The company expects to be able to pay a dividend of 10 per cent.

KALONA, IA.—The Kalona Mutual Telephone Co. held a meeting recently for the election of officers and other business. Mr. Rawson was elected president; John Durst, treasurer; U. G. Smith, secretary; Dr. Kisor, W. G. Brooke, Dr. Allen and Harry McCully, directors.

LEMARS, IA.—The LeMars Telephone Co. has elected the following officers: A. C. Colledge, president; I. S. Mayhin, treasurer and counsel; A. C. Colledge, L. N. Dalton, F. A. Post, I. S. Mayhin and E. Dukenaven, directors.

LINCOLN, NEB.—The Lincoln Telephone Co. at a recent meeting elected the following officers: C. J. Bills, president, A. W. Field, vice-president; F. H. Woods, secretary; A. C. Faulkner, treasurer.

ALBANY, N. Y.—The Independent Union Telephone Co. has elected the following officers: Samuel B. Rawson, president; Irving H. Griswold, vice-president; Theodore M. Brush, secretary and treasurer.

COHOES, N. Y.—At a recent meeting of the stockholders of the Cohoes and Waterford Home Telephone Co. it was decided to increase the number of members of the board from eight to eleven, and P. H. Andrae, of Cohoes, and F. H. Sudro and T. M. Brush, of Elyria, O., wore elected members of the board. It was also decided to put in an additional cable in certain parts of the city where the lines already erected are in use and more subscribers waiting.

ANDOVER, PA.—The Andover Electric Telephone Co. at their annual meeting elected the following officers for the ensuing year: N. H. Bishop, president; William Webb, vice-president; J. H. Hipple, secretary; E. Harmon, manager.

SALIX, PA.—At a recent meeting of the Salix Telephone Co. the following officers were elected: President, A. S. Hoffman, vice-president, W. R. Foster, secretary and treasurer, Louis Hostetler.

COMBINATIONS.

FREEPORT, ILL.—The Badger State Telephone Co. has purchased the Crosby & Blaisdell Telephone Co., and will take possession at once.

BLOUNTSVILLE, IND.—The Blountsville Telephone Co. has sold its plant to the Cambridge City Co. Mr. Lamb is president of the new company.

LIBERTY, IND.—The Liberty Telephone plant has been sold to James Davis and others for $30,000.

ST. PETER, MINN.—Stockholders of the Nicollet Co. Telephone Co. have voted to purchase for $35,000 the St. Peter Telephone Co. from James Bennett.

OLEAN, N. Y.—Mr. A. V. Hunt, of Olean, has purchased the Home Telephone Co., of Port Allegheny. He will extend the wires to Smethport and Coudersport.

PARK RIVER, N. D.—Henry Wilson, of Wymbledon, has purchased the telephone system from Noxon and Oglesby.

MADISONVILLE, TEX.—The Madisonville Telephone Exchange has been purchased by Messrs. A. B. Foster and H. D. Hunter, who are now owners of the local exchange. It is understood that extensive improvements are contemplated by Messrs. Foster and Houston.

NEW COMPANY NOTES.

RICHIBUCTO, N. B., CAN.—The Richibucto Rexton Telephone Co. has been incorporated with a capital stock of $20,000. A. B. Carson, R. O'Leary and others are the incorporators.

HASKELL, I. T.—The Haskell Telephone Co. has been incorporated with a capital stock of $10,000.

JANSEN, IA.—The Jansen Telephone Co. has been incorprated with a capital stock of $10,000.

WATERLOO, IA.—The Warren Township Telephone Co. has been organized. August Nolfe is president, W. Wendt vice-president.

BENTLEY, KAS.—The Peoples' Telephone Co. has been incorporated with a capital stock of $1,500.

BEVERLY, KAS.—The Beverly Telephone Co. has been organized with a capital stock of $3,000.

KIRWIN, KAS.—The Mutual Telephone Co. has been incorporated with a capital stock of $3,000.

LEWIS, KAS.—The Edwards County Telephone Co. has been incorporated with a capital stock of $5,000 and will construct rural lines.

PARALLEL, KAS.—The Riley County Farmers' Telephone Co. has been incorporated with a capital of $2,600 and has begun the construction of a rural line.

WEBER, KAS.—The Weber Telephone Co. has been incorporated with a capital stock of $5,000.

AUBURN, MO.—The Auburn Telephone Co., of Auburn, has been incorporated with a capital stock of $35,000. Incorporators: B. H. Ramsey, E. R. Conklin and F. W. Kelly.

BELLEVILLE, MO.—The Rural Telephone & Telegraph Co. has been incorporated with a capital stock of $2,500. The incorporators are L. D. Turner, Albert Hucke, George W. Detharding and other prominent business men of Belleville.

OXFORD, MO.—The Oxford Mutual Telephone Co. has been incorporated with a capital stock of $3,000.

HARVARD, NEB.—A new telephone company has been organized here with T. H. Matters, president; J. Yost, vice-president; S. J. Rice, secretary.

PALMYRA, NEB.—The Palmyra Telephone Co. has been incorporated with a capital stock of $4,000. The incorporators are L. E. Jones, A. R. Maiben, W. H. Epley, T. L. Stewart and O. M. Merwin, all of Palmyra.

NEW YORK, N. Y.—The Interborough Telegraph & Telephone Co. of New York has been incorporated with a capital stock of $100,000 by B. S. Mantz, H. S. Gould and O. S. Lee, Jr., of New York.

CARDINGTON, O.—The eBach Telephone Co. has been incorporated with a capital stock of $10,000 to operate a farmers' line in Clandon and Richland townships. The officers are J. Klinefetter, presiden; Levi Harriff, vice-president; Phil Richemund, secretary; W. O. Miller, secretary and manager.

SUGAR GROVE, O.—The Sugar Grove Telephone Co. of Sugar Grove has been incorporated with a capital stock of $5,000 by C. A. Carr, A. W. Anderson, T. K. Mason, J. C. Dallow and W. F. O'Garra.

WAKITA, OKLA.—The Grand Valley Co-Operative Telephone Co., of Wakita, has been incorporated with a capital stock of $2,600. The incorporators are: P. R. Smith, William Blair and L. D. Jones.

GROVER, PA.—A company to build an extension of the Roaring Branch and Liberty Telephone Line was organized at Grover recently with the following officers: President, E. L. McNett; secretary, L. W. Gillett; treasurer, W. R. Glockler.

HUNTINGDON, TENN.—The Consolidated Telephone & Telegraph Co. has been incorporated with a capital stock of $50,000. It will consist of the Sloan Telephone Co., of Linden, the Savannah Telephone Co., the Clifton Telephone Co. and the Tennessee River Telephone Co. Incorporators are J. K. Barlaw and T. S. Hughes, of Savannah, and others.

CLARKSVILLE, TEX.—The Home Telephone Co., capital $25,000, has been chartered here. Purpose, to conduct a system of telephones. Incorporators, John B. King, N. P. Doak and Hiram Glass.

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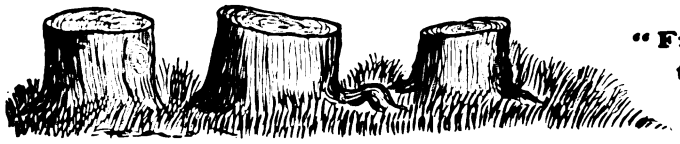
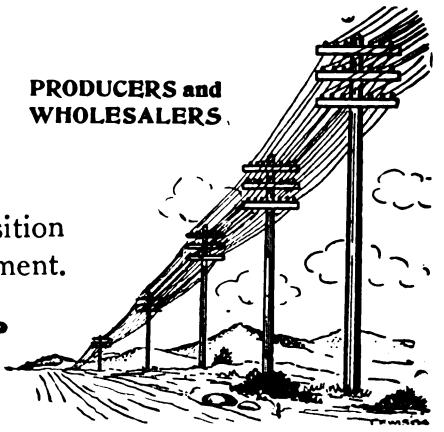
WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.



"From the Stump to the Line."



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from interference and in luxury when using the
Ericsson Desk Set
It is fitted with a combined transmitter and receiver and also a "cut in" switch in handle. Complete with generator and series or bridging bells, rings through 25,000 ohms.
Send for Catalogue, no charge.
ERICSSON TELEPHONE CO.
Mfrs. and importers of Switchboards, Telephones, and Telephone Supplies.
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Will you ever again buy cables as cheap as now?

Not unless copper takes a long drop, and none of us look for that. On the present copper market we are selling cables way below what we should. That is plain to any man that figures it. Advances are certain, and coming quick.

Big orders are coming in, and more in sight. Everyone needs cable, mostly big lots. Deliveries will be choked as badly as in 1902 and '03. (Remember them?)

Business is already heavier than most buyers think. Those now under cover are wise, because they will get THEIR cables on time, and at present prices.

Profitable contracts for future delivery may be made now if you send us your specifications. Buy enough for all of 1905. It will be good property.

TOLEDO, O. **THE F. BISSELL COMPANY**

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CHARLESTON, W. VA.—The Eglon Mutual Telephone Co. has been incorporated with a capital stock of $5,000.

HUDSON, WIS.—The Hudson Prairie Telephone Co. has been incorporated.

MISCELLANEOUS.

STUTTGART, ARK.—It is reported that, owing to the rapid increasing in extension of lines and volume of business, a re-organization of the Stuttgart Telephone Co. is to be effected, and subscriptions for stock are being received.

TIFTON, GA.—The Tifton Telephone Co. is making rapid progress in the reconstruction of its system which was recently damaged by fire.

DANVILLE, ILL.—The Vermillion County Telephone Co. has moved into its new building and is now using its new switchboard.

OOLITIC, IND.—The Home Telephone Co.'s exchange at Oolitic was recently destroped by fire.

BURLINGTON, IA.—J. C. Hubinger will commence the manufacture of selective party line systems at an early date. The factory will be located in this city and will be known as the Telephone Construction and Manufacturing Co.

KEOKUK, IA.—It is reported that the Mississippi Valley Telephone Co. is to be reorganized in the near future.

NEW LIBERTY, IA.—The New Liberty Telephone Co., which was recently organized, will construct a telephone system at once.

COVINGTON, LA.—H. H. Smith and Paul Laborde are interested in a new telephone system, which is being organized.

RUSTON, LA.—It is reported that a telephone company will be organized in this town in the near future.

LEWISTON, ME.—The Lewiston & Auburn Telephone Co. is planning to have their system in operation by January 1. It expects to begin business with about 1,700 subscribers in these two cities.

LISMORE, MINN.—The Lismore Telephone Co. has been organized.

KANSAS CITY, MO.—At a recent directors' meeting of the Home Telephone Co. the matter of an extension of the long distance lines out of Kansas City into Missouri, Kansas and Nebraska was the principal business under consideration. Those present were Henry Kichler, Jr., and E. L. Benoist, St. Louis; Arnold Kalman, St. Paul, Minn.; J. J. Heim, Hugh C. Ward, W. S. Dickey, J. J. Swofford and O. C. Snider.

BINGHAMTON, N. Y.—The North Eastern Pennsylvania Telephone Co. has entered into an agreement with the York State Telephone Co., of Binghamton, whereby the stockholders and subscribers of the North Eastern Pennsylvania Telephone Co. will be enabled to connect with Binghamton and Lestershire.

CHURCHVILLE, N. Y.—T. A. Perry and M. J. Bruton are interested in the Churchville Telephone Co. which is being organized.

MADISON, N. Y.—The Madison Mutual and the Richmond-Brewer Telephone Companies will issue a joint directory giving a list of subscribers in Madison, Solsville, Oriskany Falls, Knoxboro, Bouckville, Pine Woods, Eaton, Morrisville, Pratts, Munnsville, and Stockbridge.

CLEVELAND, O.—Cuyahoga Telephone Co. has installed two street pay telephone stations as an experiment.

DEXTER CITY, O.—The Dexter City Southwestern Telephone Co. is planning a farmers' line from Dexter City to Warner.

HAMILTON, O.—W. F. O'Gara is interested in a telephone line which will be built at Sugar Grove.

HOLLIDAYSBURG, PA.—Mr. John B. Elliott has the matter of organizing a new telephone company, with lines running through Frankstown, Catherine, Tyrone, Blair and Logan townships, in charge.

PARKERSBURG, W. VA.—The Mountain State Telephone Co., with chief offices at Parkersburg, has just received a charter from the secretary of State. Following are the incorporators: E. S. Moore, R. S. Moore, E. Browne, S. P. Moore, and P. M. McDonough Jr. These gentlemen own two telephone lines connecting Grantsville with Spencer and Arnoldsburg. They propose making some improvements, and may decide to extend their lines in other directions. The authorized capital stock of the company is $10,000. Grantsville will be the center of the system.

CLINTON, WIS.—A recent fire caused considerable damage to the wires of the Cherokee Telephone Co.

UNDERGROUND.

SANTA MONICA, CAL.—The Home Telephone Co. was granted permission to place its wires underground.

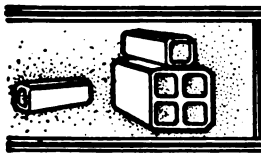
PERSONAL.

GEORGE BENNETT has been appointed manager for the Cumberland Telephone Co. at Lexington, Miss.

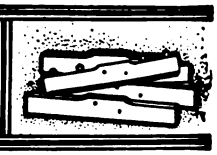
WILLIAM D. MARTIN has been appointed county superintendent for the New York & New Jersey Telephone Co., at Long Branch, N. J.

RAY MUNROE has been appointed district and local manager for the Michigan Telephone Co., at Alpena, Mich., succeeding H. C. Johnson, who has resigned to accept a position in Detroit.

HENRY ROSS has been appointed manager of the Grand Rivers, Ky., Cumberland Telephone Co. office to succeed Mr. Harry Perkins, resigned.



New Construction in the Field



FULLERTON, CAL.—The Home Telephone Co. has commenced the construction of its long distance line from Buena Park to Fullerton, a distance of four miles. It will touch the main Los Angeles-Santa Ana line at the Cox ranch.

RED BLUFF, CAL.—Work has been commenced on the Red Bluff and Paskenta Telephone line. The circuit to Warmouth is being extended to the neighborhood of Paskenta.

MIAMI, FLA.—The Miami Telephone Co. has been organized and will at once commence the reconstruction of its system, using new poles, wire and apparatus exclusively.

ALTON, ILL.—The Kenloch Telephone Co. will expend $40,000 in aerial cable construction in this vicinity.

DES MOINES, IA.—The Mutual Telephone Co. is putting in its new telephones in the vicinity of Des Moines College in North Des Moines. When that part of the new system is completed it will commence working on the down town district. Managers of the company state that they expect to have the down town telephones in by the latter part of December. The company is now in its new building, 1006, 1008, 1010 Grand avenue.

WELTON, IA.—The Delmar Telephone Co. is now extending its lines to Welton where it will connect with the farmer lines. The company has recently run its lines to Maquoketa, also to Elwood, intending to connect the farmers' lines of Delmar with those of Maquoketa, Preston, Welton and Elwood, which will in turn give them access to the Lost Nation, DeWitt and Sabula lines.

WHITEWATER, KAN.—The Whitewater Telephone Co. is completing its line from Whitewater to Wichita. The line will connect with the lines of the Wichita Independent Telephone Co. at that point.

BEAUFORT, MD.—The Peoples Telephone Co. is extending its system through Beaufort county.

MANISTIQUE, MICH.—The Manistique Telephone Co. has recently constructed a long distance line to Garden. The line will be continued to Gladstone and Escanaba.

NORWAY, MICH.—The Menominee Range Telephone Co. has completed its line to Pine Creek.

CLOQUET, MINN.—The Duluth Telephone Co. has been making extensive improvements.

EVELETH, MINN.—The Mesaba Telephone Co. is building a new line into the city.

BEATRICE, NEB.—The Independent Telephone Co. is making plans to build another telephone line southwest of Blue Springs as soon as possible.

FREMONT, NEB.—The Fremont Telephone Co. will extend its line into new territory at once.

GLOUSTER, N. J.—The Peoples Rural Telephone Co. is completing its system of rural lines in this county.

VINELAND, N. J.—The Interstate Telephone Co. has begun the construction of a trunk line from Vineland to Pleasantville.

FARMINGTON, N. Y.—The Wayne-Monroe Telephone Co. will make a number of extensions to its rural line in the near future.

FESSENDEN, N. D.—A new telephone exchange is to be installed here.

SALAMANCA, N. Y.—The Independent Telephone Co., of Salamanca, has completed the construction and equipment of three copper circuits to Buffalo, via Gowanda. Direct service is thus established to all towns in the vicinity now reached by the Inter-Ocean Co.

GRAND FORKS, N. D.—The long distance line of the Tri-State Telephone Co. was recently completed from this city to Minneapolis, Minn.

COLUMBUS, O.—Work on the new telephone circuit from Columbus to Toledo has been completed by the United States Telephone Co. as far as Amline, a point near Marysville. The circuit will be completed as far as Marysville in about ten days. From Columbus to Marysville a new cross arm is being added to the United States company's poles, but north of that point there is a space on the present arms sufficient to accommodate the new Columbus-Toledo circuit. In addition a new circuit is being built from Columbs to Plan City; and Marysville, it is said, will have an additional line into Columbus.

LAKEVIEW, O.—The United Telephone Co. has reached the grand total of 2,600 telephones on their system, and 311 miles of toll lines. Preparations are being made to install a large number of telephones next sping all over the whole system.

MARYSVILLE, O.—The new circuit of the United States Telephone Co. from Columbus to Toledo, will be completed as far as Marysville within ten days. A new circuit will also be built from Columbus to Plain City.

CANONSBURG, PA.—The State Mutual Telephone Co., a branch of the Pittsburg and Allegheny Telephone Co., is arranging to place a pay station in this village and will build a line from McConnells Mills to Canonsburg.

CARMICHAELS, PA.—The Carmichaels Telephone Co. has purchased a new switchboard and will have it installed soon. Business has grown so rapidly of late that this was necessary.

LOCK HAVEN, PA.—It is proposed to construct a telephone system reaching all of the principal farmers in Frankstown, Catherine, Tyrone, Blair and Logan townships, with connections to all the towns in Blair county.

MEYERSDALE, PA.—The Economy Telephone Co. is making a number of extensions and improvements to its system. It has a construction crew at Berlin, where it is putting in an exchange. It is about ready to enter Somerset borough. It will also have a spur line or two from Berlin.

WATSON, PA.—J. J. Beatty, of Watson, is superintending the building of an extension to the Meadville Telephone Company's inlet line. Mr. Beatty is also ooking after other extensions for the company.

BEAUFORT, S. C.—The People's Telephone Co. will extend its lines from Yemassee to Pocotaligo and McPhersonville. The company will also extend its line from Beaufort to different points along Broad river.

PAXVILLE, S. C.—The Sumter telephone line is being extended from here to Summerton.

ELK POINT, S. D.—Mr. W. W. Main is preparing to biuld a twelve-mile telephone line to Spink.

SALT LAKE CITY, UTAH.—The Utah Independent Telephone Co. is pushing its extensions in the direction of Bingham, Provo and Park City. The first mentioned place will be reached in three weeks, and the other two in the spring.

ORWELL, VT.—The Co-operative Telephone Co. is extending its lines to this village, where they will connect wth the Peoples line at Brandon. It is also building to Ticonderoga by way of Mount Independence.

SOUTH ROYALTON, VT.—The Rapid Telephone Co. is building a line from Hartford to White River Junction.

WEST UNION, W. VA.—The Peoples Telephone Co. is now putting in poles and preparing to wire this town and put in a telephone system.

WASAU, WIS.—The Wausau Telephone Co. is building a line to River View Park to give Mr. M. C. Thorn connection.

LARAMIE, WYO.—J. T. Jones has secured a contract to construct another seventeen miles of telephone line near Elk Mountain.

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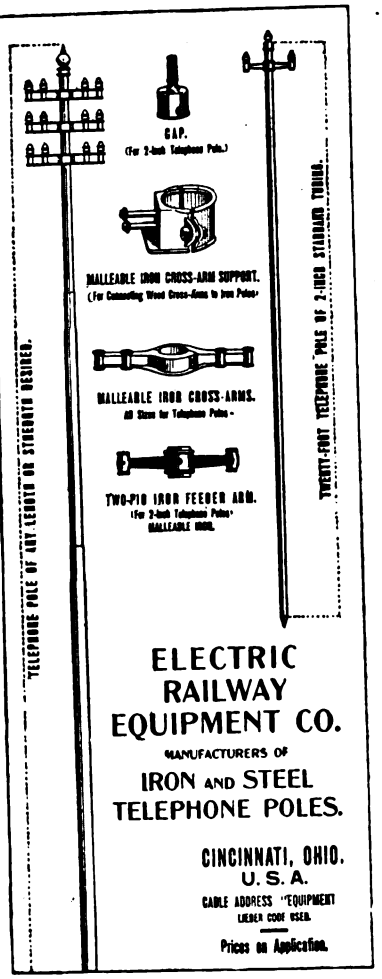

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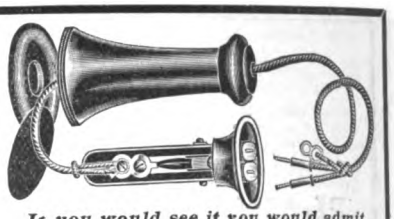

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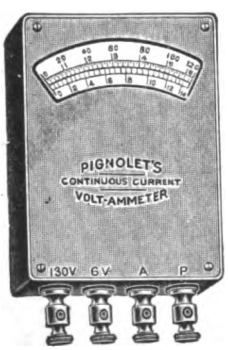

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"I consider THE AMERICAN TELEPHONE JOURNAL the greatest bargain I ever knew."

FRANK M. WELCH,
Telephone Constructor,
Martinsville, Ind.

Very convincing, is it not? We have a thousand and a half other letters equally as strong.

PAUL LATZKE, President WILLIAM H. McDONOUGH, Editor

Vol. 10 NEW YORK—DECEMBER 31, 1904—CHICAGO Number 27

PUBLISHED WEEKLY ONE DOLLAR A YEAR

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The AMERICAN TELEPHONE JOURNAL

NEW YORK: 116 Nassau Street CHICAGO: Monadnock Building

Subscriotion price $1.00 a year, payable in advance; foreign countries $3.00; single copies 10 cents.
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THE CONSTRUCTION OF RECEIVER HOLDERS.....By HAROLD A. McMANN
TELEPHONE EXCHANGE ENGINEERING, Article XXI, Condensers (Continued)
By RAY H. MANSON, ALBION D. T. LIBBY AND CHARLES A. SAMPSON

The Operating Field.

MEETING OF PENNSYLVANIA ASSOCIATION
MAYOR OF LEBANON, ILL. VETOES BELL FRANCHISE
INDEPENDENT EXTENSIONS IN THE STATE OF WASHINGTON
FINE SHOWING OF CUYAHOGA
SOME TELEPHONE FACTS FOR YOU TO REMEMBER
IN THE MANUFACTURING FIELD
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TRI-STATE WINS CONTRACT OVER BELL
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THE TELEPHONE IN THE COURTS
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Best Prices to Small Independent Companies

McINTIRE'S (Patent) CONNECTORS for Iron Wires all Sizes and Special Single Tube Connectors ... ...
Special Connectors for Hard-Drawn Copper Wire ... ...

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Cords for Telephones and Switchboards
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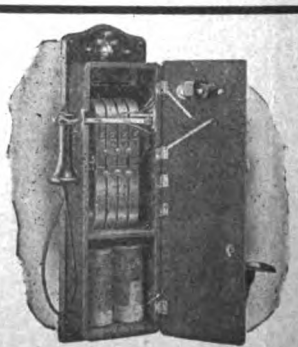
Latest and Newest Inventions. Indispensable.

Write for circulars and full information. We have exceptional means for financing new and useful devices and articles of various kinds.



If you can't ring everybody on your country line with this, your wire is down.

Write us.
Eastern Telephone M'f'g Co.
WEST CHESTER, PA.

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HAVING TROUBLE?

Ringing on your Farmer's or Party lines when the subscribers are listening on the line? Put our X-P Condenser in your Bridging Telephones and your troubles cease.

PRICE IS LOW

ACTUAL SIZE

YOU WILL WANT IT

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Write us and we will give detailed information

CHICAGO and SAN FRANCISCO

MORGAN & WRIGHT TAPE IS GOOD TAPE

Possesses exceptional adhesive qualities.
Will not dry out.
Unrolls smoothly and easily.
Has uniform insulation.
Is peculiarly free from pinholes.
Has high insulation resistance.
Is capable of withstanding extreme heat much longer than is required by the most severe tests.
Possesses an uncommonly high percentage of insulation composition.

Samples and prices furnished on request.

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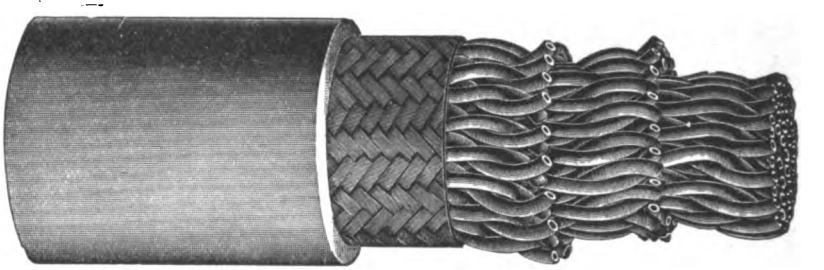
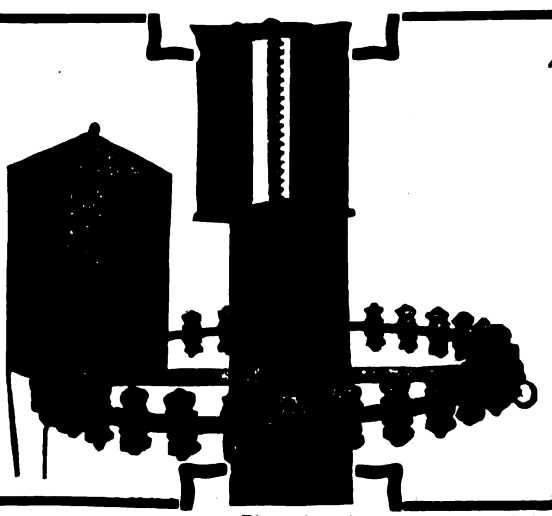
Manufacturers of

"Paranite"

RUBBER COVERED TELEPHONE WIRES AND CABLES :: :: ::



INDIANA RUBBER AND INSULATED WIRE CO. JONESBORO, IND.



THE HALL TYPE D. CABLE TERMINAL

WITH DISTRIBUTING RING

Designed especially for ***Underground Installations.*** Each pair provided with ***Absolute Lightning Protection,*** and mounted on ***Hard Rubber Only.***
Write for Catalogue.

Mountain State Electrical Company,
Sole Manufacturers,
WHEELING, W. VA.

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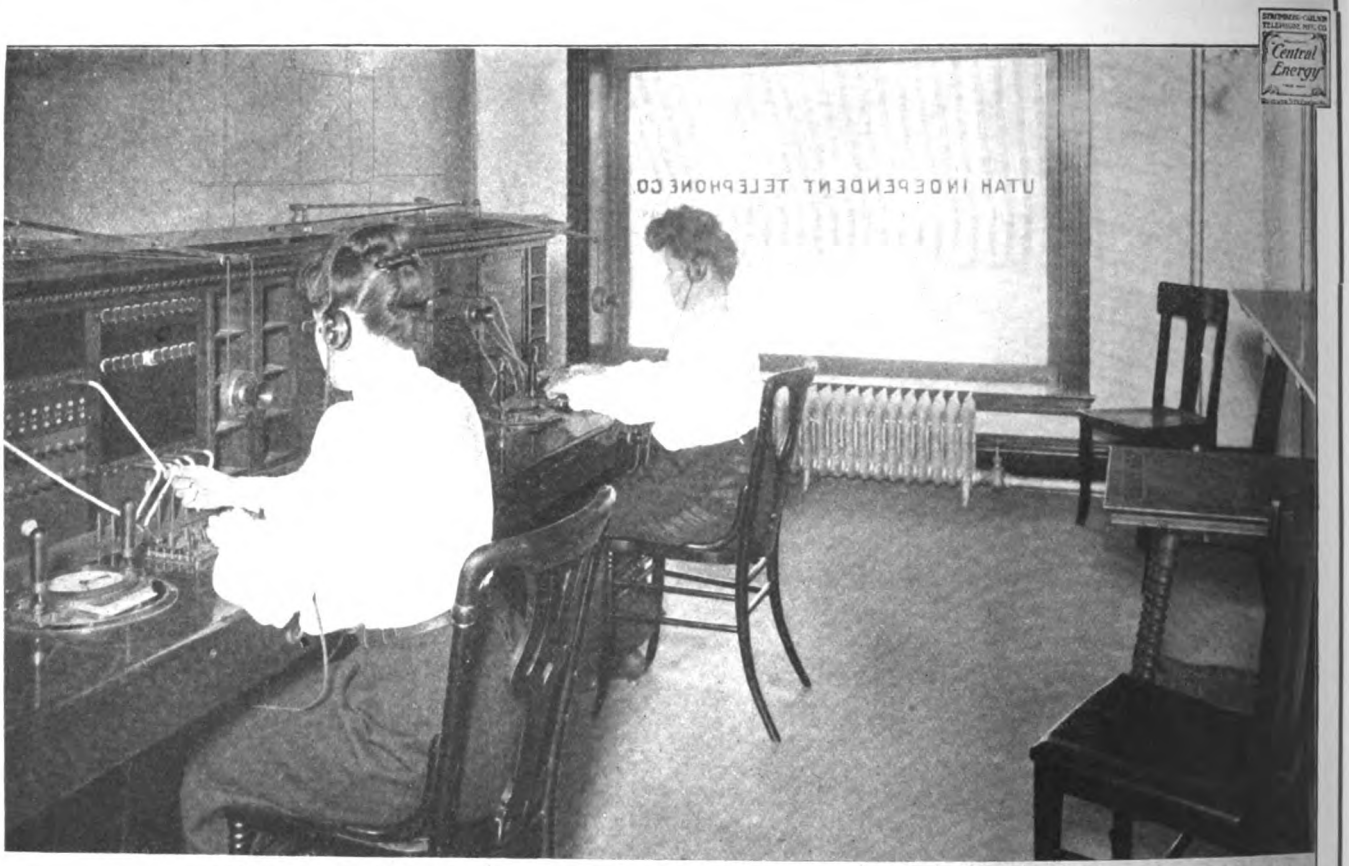
STROMBERG-CARLSON TOLL BOARDS

This illustrates one page taken from our Toll Board Bulletin No. 12-B.

The information we give on the subject of "Toll Equipments for Telephone Exchanges" should be of value to every exchange manager.



FOUR-POSITION TOLL BOARD—TWO SECTIONS
CABINET No. A-2474
AS OPERATED BY
UTAH INDEPENDENT TELEPHONE CO.
SALT LAKE CITY, UTAH

No other catalog or bulletin ever issued deals with this subject so extensively.
We are glad to mail a copy to managers interested in this subject.
Just ask for Bulletin No. 12-B.

Stromberg-Carlson Tel. Mfg. Co.

General Offices,
ROCHESTER, N. Y.

Western Sales Office,
CHICAGO, ILL.

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100% GOOD

"TRIED AND TRUE"

CENTURY MAGNETO TELEPHONES have proven themselves to be absolutely reliable at all times.

They are perfect in construction, even to the smallest detail. The material and workmanship are of the very best.

The Transmitters are equipped with Platinum Electrodes, which prevent any of the troubles common to carbon electrode transmitters, such as frying, packing, etc.

There are many other good features in these telephones. We will send you a sample on sixty days trial, charges prepaid.

WRITE FOR PRICES.

CENTURY TELEPHONE CONSTRUCTION CO.
536 ELLICOTT SQUARE
BUFFALO, N.Y.

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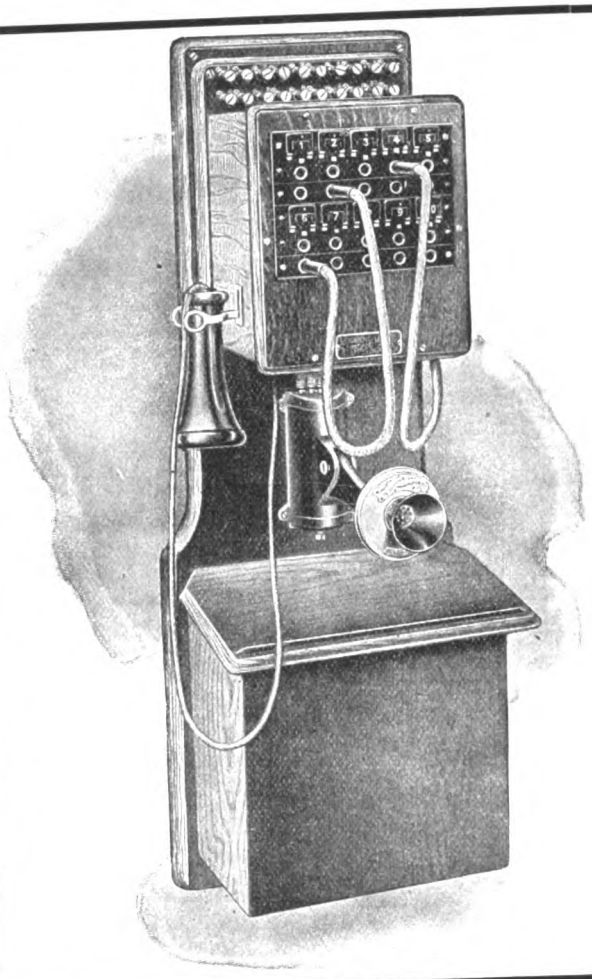


A Small One?

Yes, and the first one; but all great things start from small beginnings.

This is the first MONARCH board placed in operation and it used but 10 drops and jacks. Since then, just two months ago, we have sold over 2,000 drops and jacks installed in boards. The smallest is here shown; the largest has 300 drops and jacks. It will interest you to get a complete description of the

Monarch Switchboard.

It will pay you to get our prices.

MONARCH TELEPHONE MFG. CO.

10-16 So. Clinton St. Chicago, Ill.

"COUCH"

Automatic Reset

Intercommunicating

'Phones

are made in several styles for both wall and desk use. The standard sizes are 10, 16, 20, 26 and 30 station capacity

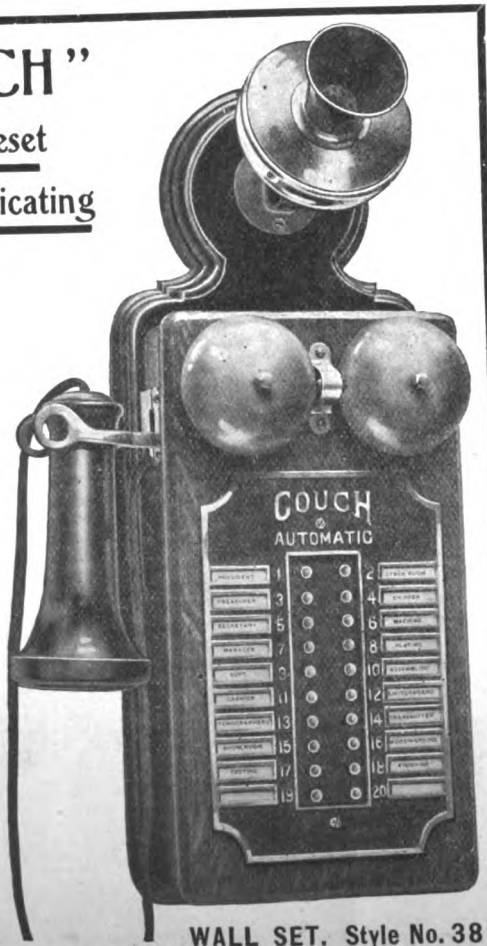
Local or Central Battery Systems

Ideal service for factories, offices, homes, etc.

Exchange men should promote this service and connect same to their exchange.

Increases your profits. Get posted anyway.

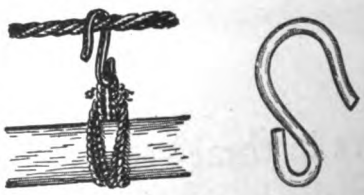
S. H. Couch Co.
Manufacturers
162 Pearl Street
Boston, Mass.



WALL SET. Style No. 38

Security Marline Cable Hangers

Made to fit any size cable.



See that Snap?

No trouble to do. It snaps over the strand and never leaves it.

If anyone doubts the endurance of Marline let him cut a piece which has been wrapped on some part of a sailing vessel for ten or twenty years. He will find it weather-beaten outside, but clean and bright at the core and each strand still capable of supporting fifty pounds or over.

Ask for Bulletin 118 M.

THE F. BISSELL COMPANY.
Manufacturers and Jobbers of
TELEPHONE SUPPLIES
226-228-230 HURON STREET
TOLEDO, O.

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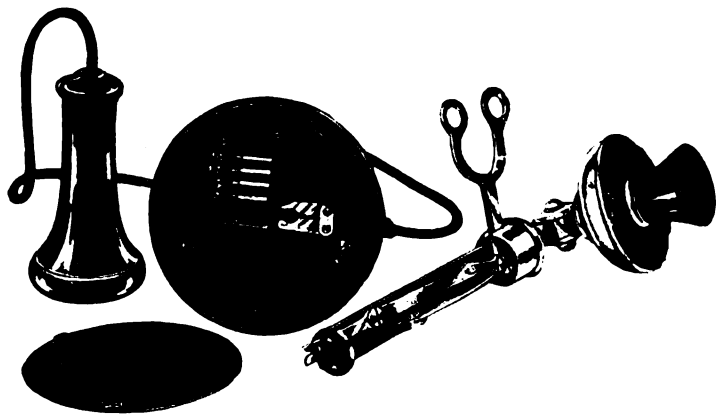
DEAN

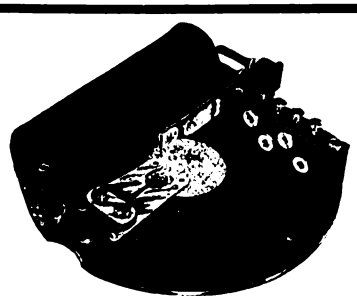
TELEPHONE APPARATUS

MADE with a seamless steel inner framework. Exposed metal parts are finished in heavy nickel plate. Upright encased in a hard rubber tube. No unsightly wear or tarnish.



THE Dean desk stand can be opened as shown above without the use of tools or without disturbing the wiring, thereby fully exposing all working parts. No loose screws or small parts to be lost in this operation.

The hook switch contact springs are mounted edgewise within the base, and are open for inspection by simply removing the base cover.



THIS INTERCHANGEABLE CIRCUIT PLATE, mounted in the base of the Dean desk stand, contains all of the talking apparatus, switch springs and connecting rack, completely wired. These units are arranged for ***local*** or ***common battery,*** the remainder of the stand, excepting the transmitter, being the same for both services.

For a complete description see our little booklet No. 2, which will also tell you why Dean telephones give the best possible service.

THE DEAN ELECTRIC COMPANY

ELYRIA, OHIO

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THE KELLOGG SWITCH-BOARD & SUPPLY CO.

Has Again Received

WORLD'S FAIR HIGHEST AWARD

FOR TELEPHONE SYSTEMS AND APPARATUS

IT was the GOLD MEDAL at the Buffalo Exposition. Now it is the GRAND PRIZE at the Louisiana Purchase Exposition, and the largest cities in the United States, equipped with Kellogg Telephone Systems, will heartily bear out with their recommendations the assigning of this award.

Write for our catalogues, bulletins and quotations.

The Kellogg Switchboard and Supply Co.

Green and Congress Streets, Chicago

SEYMOUR BUILDING
LOS ANGELES

ELECTRIC BUILDING
CLEVELAND

KEYSTONE TELEPHONE BUILDING
PHILADELPHIA

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Don't Growl at Central

for not answering the

FIRST RING

525,600 Minutes in the New Year

During most of these Minutes, "Central" must select her Rings from the rings of the Rural Subscribers calling Each Other.

Equip your Lines with our

Selective Central Relay

and your Old Telephones with Our ATTACHMENTS then

"CENTRAL" WILL ANSWER THE FIRST RING

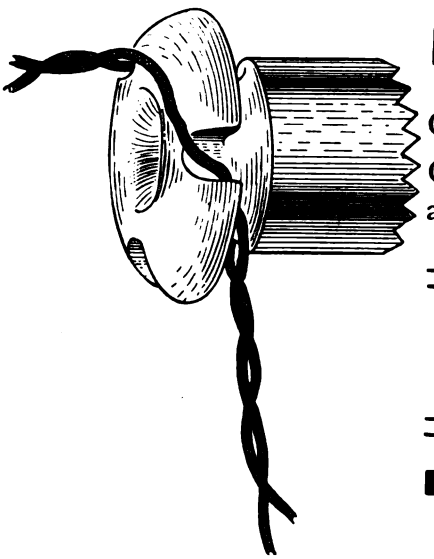
For ground, straight, metallic or divided circuit.
A postal from you will bring a complete description and prices.

T. & A. Selective Call Co.

Sole Manufacturers GENESEO, ILL.

Patented.

Polk Cut in Knob



No tie wires

Can't pull off.

Can run wires in any direction.

Send for Sample

Price per M $20.00

Wholesale Telephone Supplies

The W. G. Nagel Electric Co.

TOLEDO, OHIO

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UP-TO-DATE **TELEPHONE BATTERIES** MUST HAVE

HIGH CAPACITY CONSTANT CURRENT FLOW

MINIMUM DEPOSIT IN BOTTOM OF CELLS

EXTREMELY LOW INTERNAL RESISTANCE

FOR FACTS AND FIGURES WRITE THE

NATIONAL BATTERY COMPANY

NEW YORK OFFICE: 253 BROADWAY.

GENERAL OFFICES AND WORKS: BUFFALO, NEW YORK.

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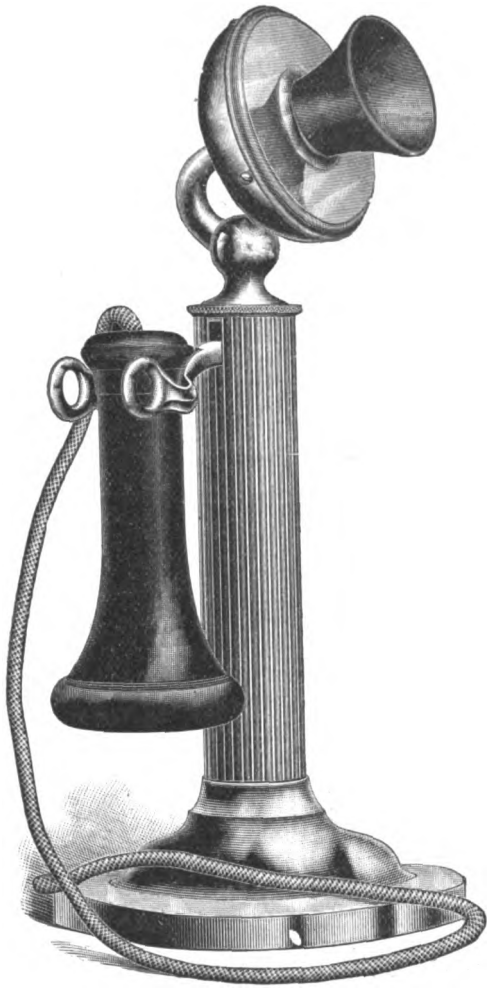
No. 19
Desk Stand



Self-Contained Hook and all connections withdrawn by removing one screw.

Platinum Contacts
Heavy Cast Hook

Sterling Electric Co.
LaFayette, Indiana

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Runzel-Lenz Electric Mfg. Co.
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Hubbard & Co.
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Telephone Printing Co.

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CORRESPONDENCE SCHOOL.
Amer. School of Correspondence.

CORPORATION RECORD BOOKS.
Middleton & Co., J. W.

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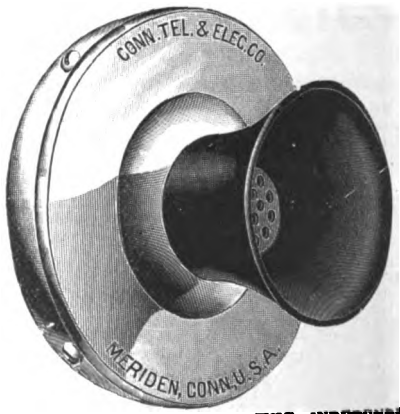

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Quality! Volume! Clearness!
ADOPTED BY UP-TO-DATE MANAGERS.

Guaranteed
Not to Pack or Deteriorate with Years of Constant Service

To introduce to new managers we will mail one sample only, postpaid

For $1.00

for a limited time only

SEND FOR OUR LARGE CATALOG

Conn. Telephone & Elec. Co.
MERIDEN, CONN., U. S. A.

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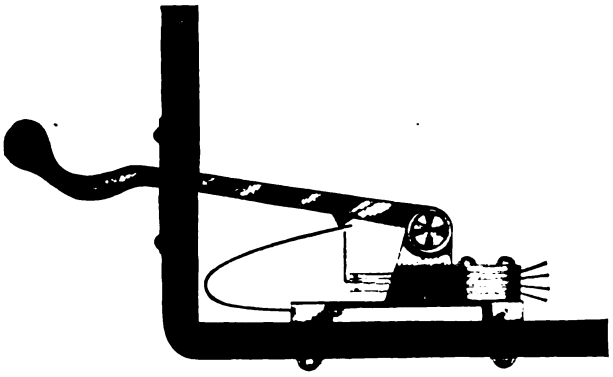
A Simple Question—Easily Answered. Where to get Telegraph **POST HOLE BARS** that will meet all requirements. Bars that are made of **Stiff Crucible Tool** Steel, that will spring back to shape. Ones that your men cannot break or destroy.

HUBBARD & COMPANY, Pittsburg, Pa. **CAN and DO Supply Just That Kind.**

Manufacturers TELEPHONE and TELEGRAPH LINE HARDWARE.

Cross Arm Braces, Anchor Rods, Pole Steps, Pole Rings, Cable Seats, Etc.

Place Trial Order and Compare RESULTS.



We call attention to our new style

SWITCH HOOK

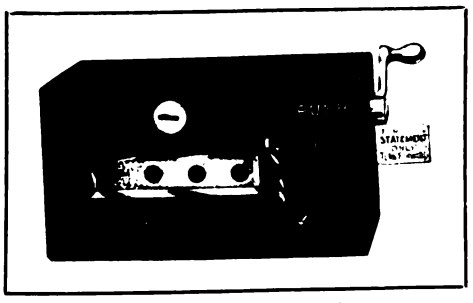
which has been pronounced by experts as **ELECTRICALLY PERFECT.** Has four genuine platinum contacts and no pivot connections. Is perfectly **BALANCED** and **ENTIRELY SELF-CONTAINED.** In fact, it is right in line with the entire output of this Company, whose aim it is to keep their apparatus up to the highest standard of excellence.

THE WILLIAMS TELEPHONE & SUPPLY CO., **No. 73 CENTRAL AVENUE, CLEVELAND, O.**

Don't be Hanging Back

just because some other companies are slow to

Install Measured Service.



Takes statement over the wire.

Profits, satisfaction, and the right devices to guarantee them, is what you want to build up your business.

Measured Service Company,

Manufacture What You Want.

153-159 So. Jefferson St. **Chicago.**

Ring Out the Old Year and Ring in the New with the

Little Gem RINGER

It's time to Ring out the old style boxed Ringer and Ring in this new one.

SHEATH OPENS LIKE A CUFF

The best to use because the best looking, most accessible and in every way the most satisfactory Extension Bell on the market.

Series $1.50, 1000 ohm $2.50, 1600 ohm $2.75

The Vought-Berger Company

MAKERS OF FIRST-AWARD

Telephones and Switchboards

La Crosse, Wis., U. S. A.

Mail this with your order; it will bring you a rebate of 25c. per bell

Fill Out, Mail To-Day.

Please send me .....Little Gem Extension Bells.

Ringer movement .....

Name.....

Address.....

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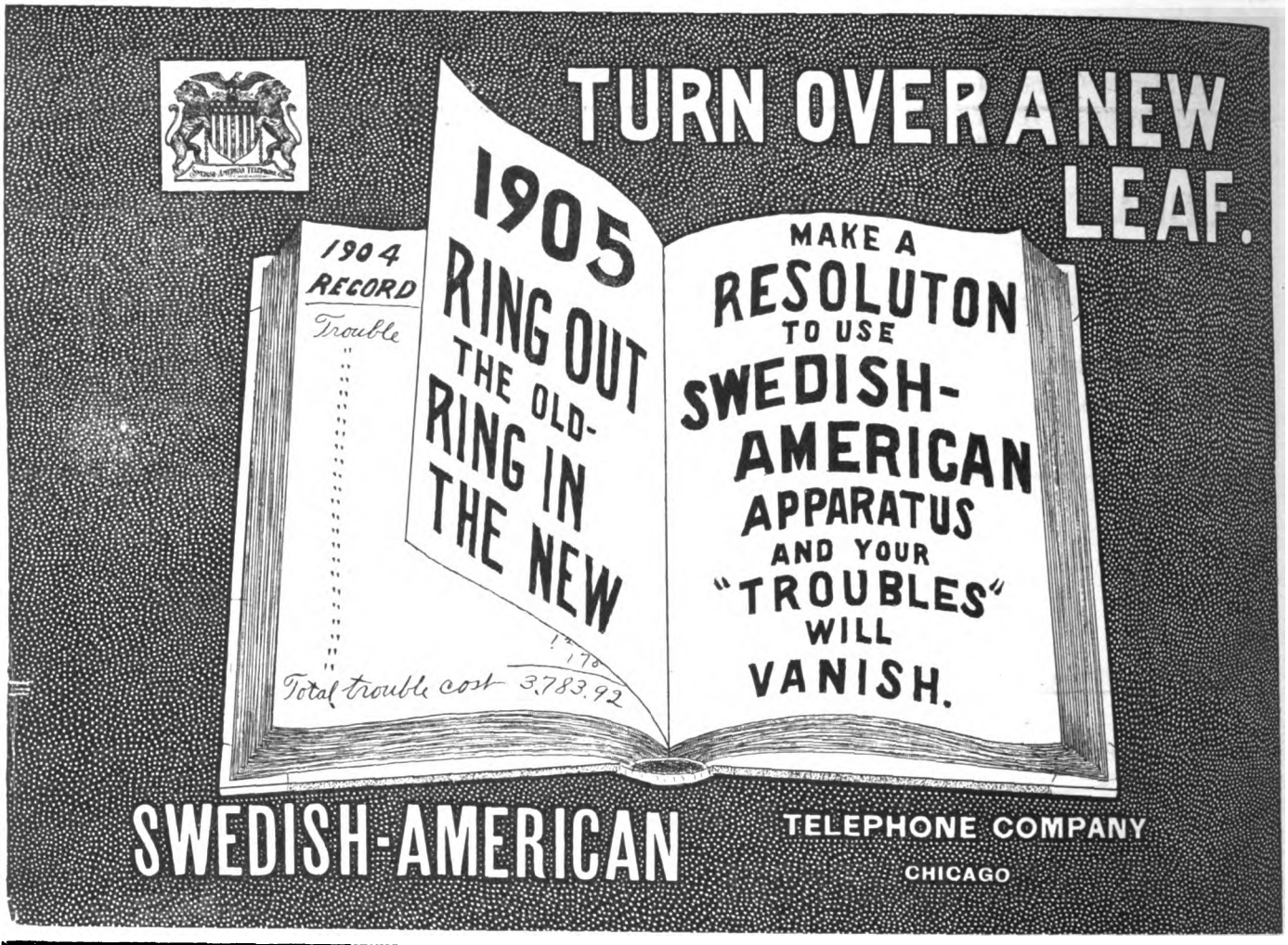
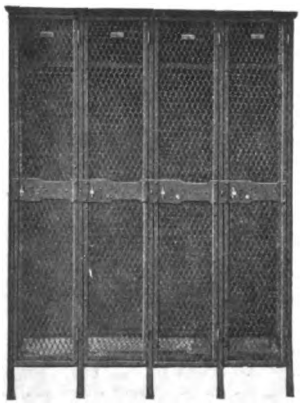




LOCKERS

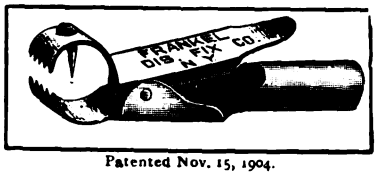
or material closets made by us of Expanded Metal or solid Sheet Steel insures positive security to the contents.

Have points of superiority over all others.

We make metal shelving and inclosures.

Write for Catalogue.

MERRITT & CO.
1010 Ridge Av., PHILA.



Patented Nov. 15, 1904.

Your Employees Accomplish ½ More

in a given time if you furnish them with the Frankel

Patent Wire-Testing Clips

Makes instant, positive test connection on any size wire without removing insulation. Cost almost nothing; saving of time in a single day pays for them.

In 1 Dozen lots, 12½c. each
" 100 " 11c. "
In 500 lots, 10c. each
" 1,000 " 9c. "

Order a Dozen or a Hundred Now!

FRANKEL DISPLAY FIXTURE CO.
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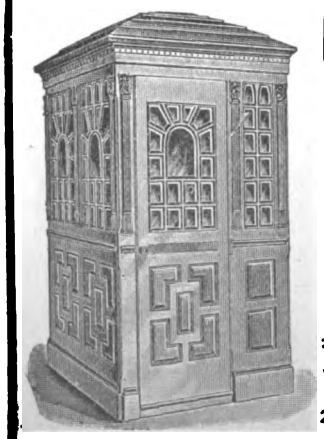

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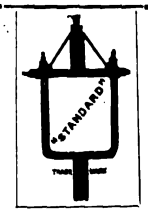
Telephone Wire  **and Cables**

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VOLUME 10 SATURDAY, DECEMBER 31, 1904 NUMBER 27

MILITARY TELEPHONES

By Dr. Alfred Gradenwitz.

MODERN warfare extends over so great areas that too much stress cannot be laid upon the preparation of facilities whereby a commander may be placed in constant relation with all of the corps which are operating on the field. In the past much attention has been given to the development of telegraphic facilities, in such a manner that telegraph stations could be installed and a line strung from place to place around the battlefield with great celerity. And now the telephone comes to the front demanding recognition for the same purpose.

It would be trite to endeavor to repeat all of the advantages to which telephonic communication could be put as an aid to the military commander. The lightness and portability of the apparatus, the ease with which a line can be strung, and the fact that communication does not require any particular skill, as is necessitated by the Morse code, all go to make this means of communication particularly advantageous for the temporary work of the battlefield. Even in times of peace, telephonic communication between the divisions of a practice corps, or upon the grounds of a military academy, as a means in training, cannot be overestimated.

At first sight it would appear that a cavalry regiment could have very little use for the telephone, as it would naturally have to be operated over a space so great as to preclude the possibility of connection by wire. But even here the telephone has found an acceptable field. Each trooper can carry upon his saddle a light coil of wire, and may often rapidly string the same along the ground by allowing his horse to walk, while the cable unwinds itself; and thus in a reconnoissance a single horseman may convey in this manner to headquarters information which could not be secured in any other manner.

The technical side of the problem of building telephones for army use is a serious one, to which but little attention has been given in the past; and consequently it is not unnatural to find that telephonic apparatus has not been received by the army with particular favor. It is necessary to design special apparatus, as the conditions to which the instruments are exposed are entirely different from those commonly found. For example, in frosty weather the breath of the speaker will congeal and be deposited as a film of ice upon the diaphragm, preventing the receiver from responding. Or the telephone outfit may fall into a ditch, and, becoming thoroughly saturated, will be entirely out of commission, unless built in a manner to be absolutely water proof.

The horse of a cavalryman may become entangled in the wires over the field and rupture same by a single kick unless so constructed as to withstand an accident of this description. In a general way, all of the apparatus should be built in the most solid, substantial and durable manner, with particular care to the avoidance of all screws, binding posts and other parts which are likely to be loosened under severe usage. Each portable outfit should be so designed as to be practically ready for instant service, avoiding entirely the consumption of valuable time in unpacking and arranging the instruments in such a manner as to be ready to talk.

It would appear on first thought that simplification might be secured by using a magneto instrument both as a transmitter and receiver; but, unfortunately, it has never been practical to build

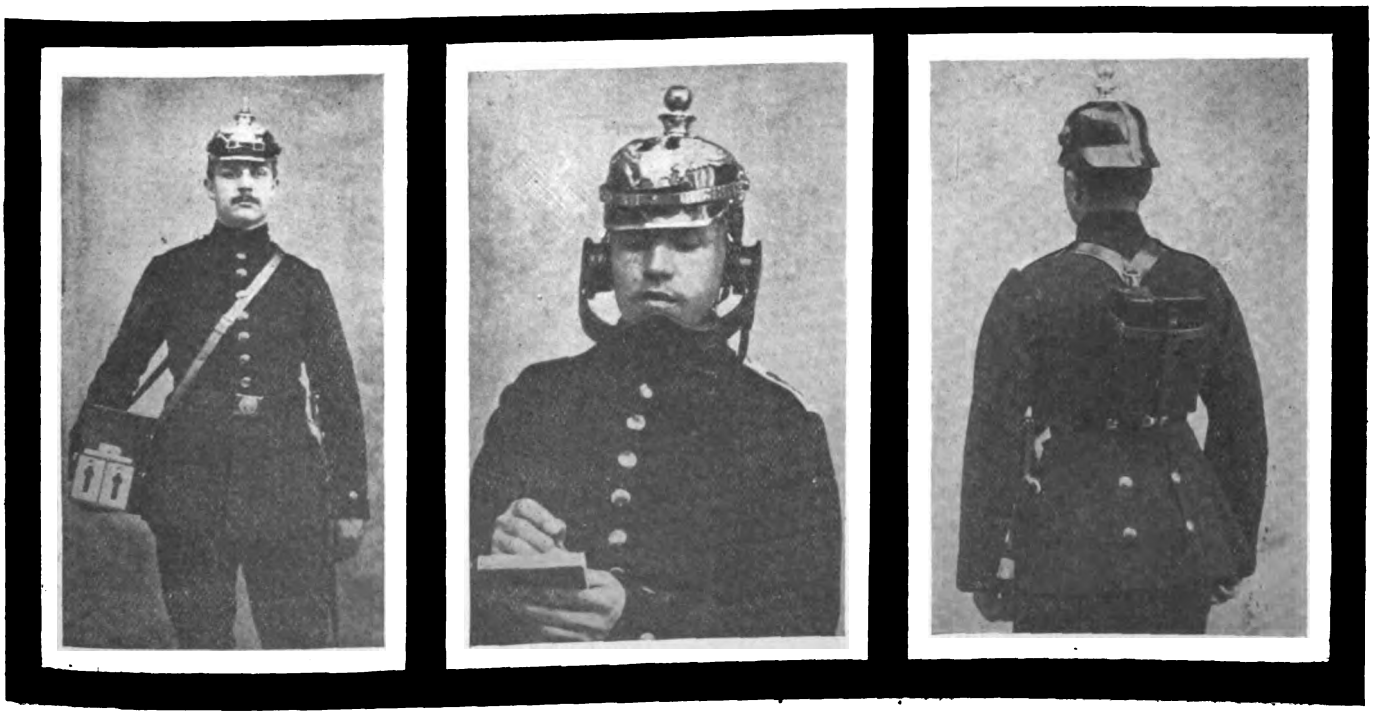

Fig. 1. German soldier equipped with scout set.

Fig. 2. Combined Transmitter and Receiver with Head Piece to Allow Free Use of Hands.

Fig. 3. Portable Carrying Case as Worn on the Back Similarly to a Knapsack.

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one which would talk with sufficient loudness to be valuable upon a battlefield; and, therefore, the regular outfit of the carbon microphone and a magneto receiver must be provided in order to be serviceable. The receiver should be particularly compact, and at the same time provided with very powerful magnets and windings proportioned to the current sent by the transmitter. It is well to supply every set with a pair of receivers arranged upon a proper head brace, so they may be secured to both ears of the operator in such a manner as to leave his hands entirely free for other manipulations. The microphone must be an exceedingly

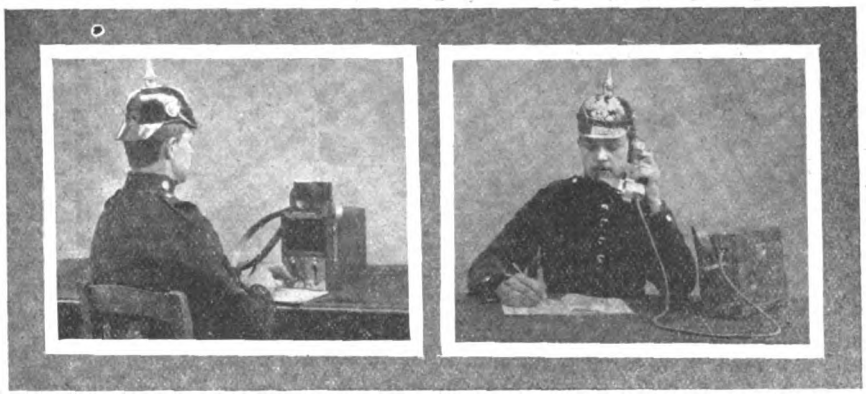

Fig. 4. Telephone Scout Set of German Army in Operation.

Fig. 5. Portable Set Using Hand Microtelephone.

powerful one, preferably provided with a carbon diaphragm, for it has been found that a carbon diaphragm can be made sufficiently substantial so that it will not be injured in transportation. From many standpoints the carbon diaphragm is less liable to accident from other causes than the ordinary metallic one, and superior in its ability to give free, clear, distinct and loud transmissions. To produce a loud-speaking transmitter, it is necessary to so arrange the granular carbon that it shall not burn or oxidize under the heavy currents delivered by the battery; and it is also desirable to so design the microphonic parts that they may be readily replaced in case of accident, and to provide each cavalryman with one or two duplicate carbon capsules, which may in a few seconds be inserted in case of accident.

The calling device is an important feature. The ordinary call bell has not been found so successful as the buzzer, and for many reasons; notably the fact that the call bell produces too loud and piercing a tone, and frequently might notify the enemy of the presence of a scout. Again, the buzzer can be made to operate inductively from a telephone line and thereby can transmit Morse signals, or any other form of code which may be adopted, insuring the secrecy of the messages sent. For this purpose a differential buzzer designed by Mix & Genest is so arranged as to do away with all adjusting springs, employing two magnets, one of which operates against the other in a differential fashion. This avoids complication and the liability to disarrangement which is inherent in the spring, and provides an instrument which may be operated with any intensity of current that may be desired. In some cases the telephone stations may be so arranged as to use the Rysselberghe system, thus rendering it feasible to talk and telegraph simultaneously over the same set of conductors. The Germans have recently made considerable advance in the designing of military telephone apparatus, which is herewith illustrated.

Figs. 1, 4 and 7 show the scout set, which is of simple construction, the entire apparatus being contained in a case carried over the shoulder by a leather strap. When desired for use, it is simply necessary to unstrap the box and open the cover, disclosing the microphone. In this instrument the receiver can talk sufficiently loud so that those with fairly acute hearing can understand conversation without the necessity of attaching the receiver to the ear. Another form of apparatus is illustrated in Figs. 6 and 8, which is simply a modification of the familiar combination set so frequently seen in Europe. This may be as light and small and compact as possible, so that it may be placed in the pocket without requiring the use of the carrying case.

Fig. 2 suggests a system in which the receivers and microphone can be attached to a single head band, and thus enables the operator to clamp the three instruments in the best respective positions upon the head, both for receiving and for talking. Fig. 5 is a type of portable apparatus contained in the carrying case, which includes all of the accessories which are necessary, such as battery, call bell, band, receiver and transmitter. The box is made of aluminum, so as to be strong and at the same time light, and can be readily carried in a leather pouch or in the saddle bag. The batteries must necessarily be proportioned to the service. They are dry cells, having small internal resistance, and possessing a charge capable of developing strong currents for a short period of time. Fig. 3 shows the portable carrying case shown in Fig. 5 attached to the back of an officer in such a way as to be easily carried, and at the same time attract but little attention. The field conductors form an important part of the outfit, for the value of the telephone in the field depends very much upon the quickness with which a conductor may be strung and the message delivered. The best conductor for the purpose seems to be a pair of fine copper wires, carefully insulated, and then overstrung with a couple of fine steel wires of the strongest description. By this means a cable of great flexibility and at the same time of great strength, together with the necessary insulation, can be secured.

The obvious advantages possessed by the telephone where it has been designed for military work has not been overlooked by any of the progressive powers. In Germany perhaps, the mechanical design has been furthest developed, but other countries are not far behind. In England its use has become general, primarily from the results obtained in the South African war. Russia and Japan each place a great deal of reliance upon telephonic communications, there being several instances on record where the telephone was a prime factor in attack and defense. In the United States telephone scouts form a part of the forces of many of the regiments of the National Guard, either as an independent corps or else in conjunction with the electrical department of engineering battalions, and in the regular army the telephone is rapidly supplanting other means of communication.

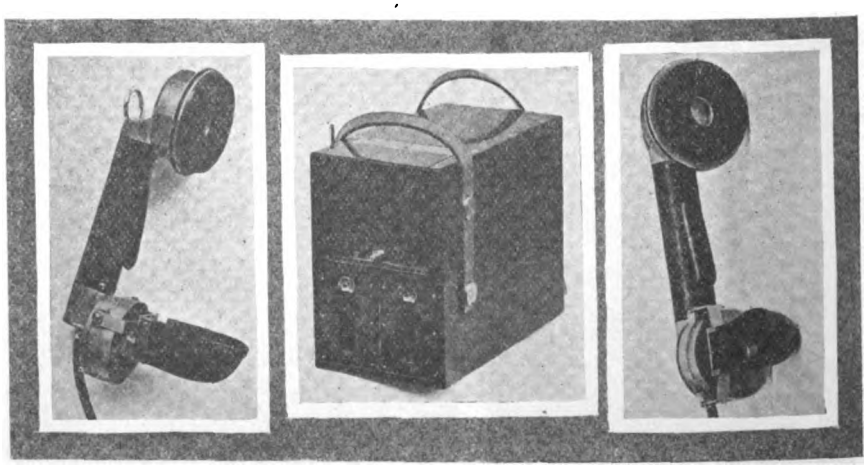

Fig. 6. Hand Microphone, Showing Heavy Construction. *Fig. 7. Scout Telephone Set as Used in German Army.* *Fig. 8. Illustrating Peculiar Shape and Adjustment of Mouth Piece.*

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THE CONSTRUCTION OF RECEIVER HOLDERS.

By Harold A. McMann.

PROBABLY no inconvenience incidental to the use of the telephone is more greatly experienced than that of holding the receiver to one's ear. The necessity of doing this naturally precludes the use of both hands for writing, etc. Devices are constantly being brought forth to overcome this difficulty, but to one of a mechanical or ingenious turn of mind, the construction of a home-made holder may prove of interest; to one at all familiar with the use of ordinary tools the problem will present few difficulties.

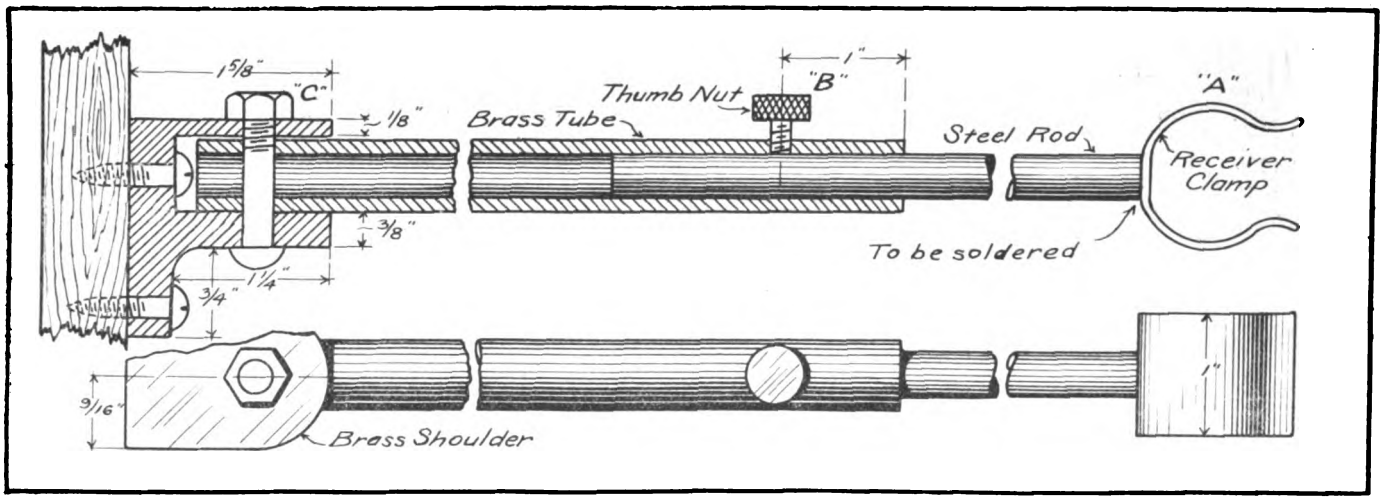

Fig. 1.

In Fig. 1 is illustrated one type of holder that may be easily made. The first thing to get is a piece of steel rod 3/8" diameter and about 8" long. Next obtain a piece of smooth, straight brass tubing about 12" long; the inside diameter of this tube should be a trifle over 3/8" to enable the rod to slide in and out without causing it to jam. At one end of the tube a hole 3/16" in diameter should be drilled about 1" from the end of the tube and tapped with a 1/32" thread; a small thumb nut should be fitted to the hole. At the other end of the tube, about 1/2" from the end, a 1/4" hole should be drilled. A clamp to hold the receiver should now be made of a springy piece of brass about 3/32" thick and 1" wide, and bent to conform generally to the shape of the receiver; this is shown at "A" in Fig. 1. It should be bent so that when the receiver is put in place it will be held firmly; it is also a good plan to glue a piece of felt on the inner side of the clamp to avoid marring or scratching the receiver. The clamp should now be soldered to one end of the steel rod, as shown in the drawing.

The next consideration is a shoulder or brace to hold the brass tube; this should be, if possible, cast of brass according to dimension of the drawing. If the means for casting are unavailable it may be filed out of a piece of soft brass. Two holes should be drilled, 3/16" in diameter, through the back, and two holes through the two lugs; these latter two should be large enough to accommodate a 1/4" bolt.

The brass tube may now be fitted to this shoulder and held in position by a 1/4" bolt and nut. The steel rod should be slid in the tube and the thumb nut tightened up; if the rod slides in and out too stiffly a little oil or graphite may be applied, which will remedy the evil.

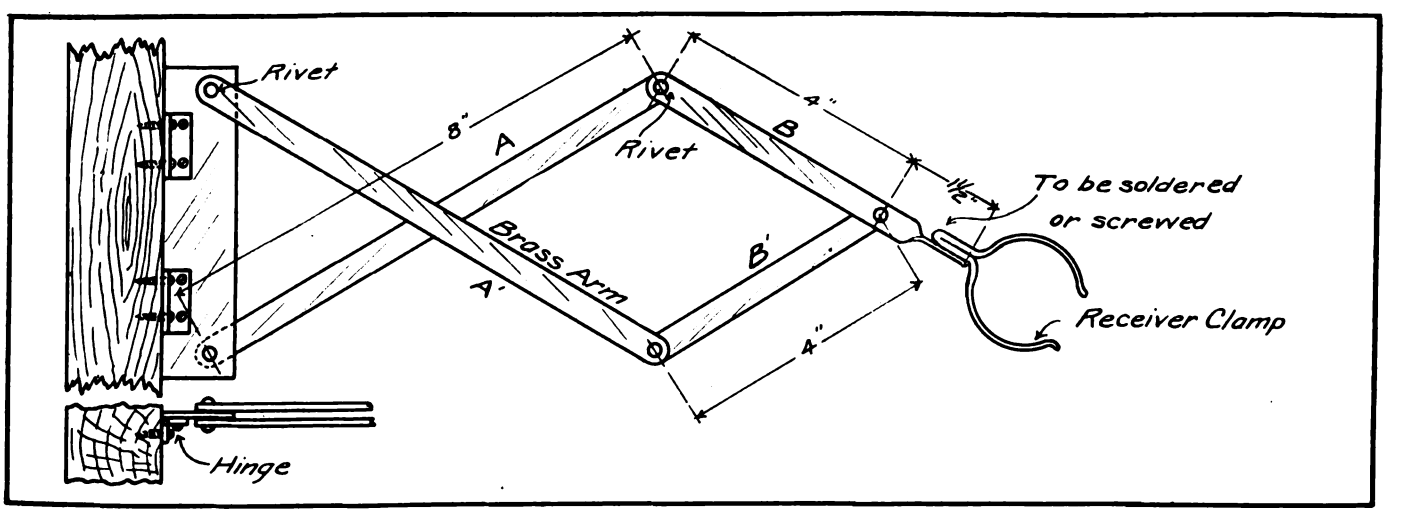

Fig. 2.

The contrivance is now ready for use; it should be screwed either to the backboard of the telephone or the wall. The receiver is placed in the clamp and the steel rod slid in or out until the desired adjustment is obtained; the adjustment may be made permanent by tightening the nut "B." The nut on the shoulder at "C" should be loose enough to allow the tube and rod to be swung clear of the telephone when not in use, and yet not so loose that it will swing out of position when the ear is applied to it.

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The second type of receiver holder is illustrated in Fig. 2. It consists essentially of a series of hinged arms working on the lattice principle; these should be ½" wide and ⅛" thick. The arms A and A^1 are 8" between the centers of the holes at each end, which are 3/16" in diameter. The arms B and B^1 are 4" between centers, with 3/16" holes at the ends; the length of the arm B should be about 1½" longer beyond the hole on one end than on the other, and should be twisted 90°, as shown in the drawing; this extension is to provide room for the receiver clamp, which should be soldered or screwed on. The shape of this clamp differs slightly from the one previously described, but is made of the same material.

All of the arms should be neatly rounded off on the ends and put together either with rivets or small bolts and nuts; the rivets are to be recommended, as there is no possibility of their working loose. A block to hold the now completed lattice should be made of a piece of brass ½" thick and about 5" long and 1" wide; two small, stout hinges are to be fastened on one side, as shown in the drawing, to enable the device to be swung out of the way when not in use. Either of these receiver holders may be greatly improved in appearance if nickel plated, which can be done at a small extra expense.

The third type is constructed on very original lines, as shown in Fig. 3. It consists principally of the flexible part of a portable electric-light holder, which may have been relegated to the proverbial scrap heap. The base and standard should be cut off with a hack saw at "A," leaving about 2" of the standard; the lamp socket may easily be removed by taking out the screws that hold it together.

A base should be turned out of brass or hard wood; if a lathe is unavailable it may be made square with equally good results. A hole should be drilled and tapped in the center, and the end of the standard screwed in place; a thread should be cut on the end for this purpose. A clamp for holding the receiver may be made according to the drawing, of the same material as the previous ones; a small hole is to be drilled in the center. The end of flexible tube should be plugged up with hard wood; then through the hole in the clamp insert a screw, and fix the clamp to the end of the tube.

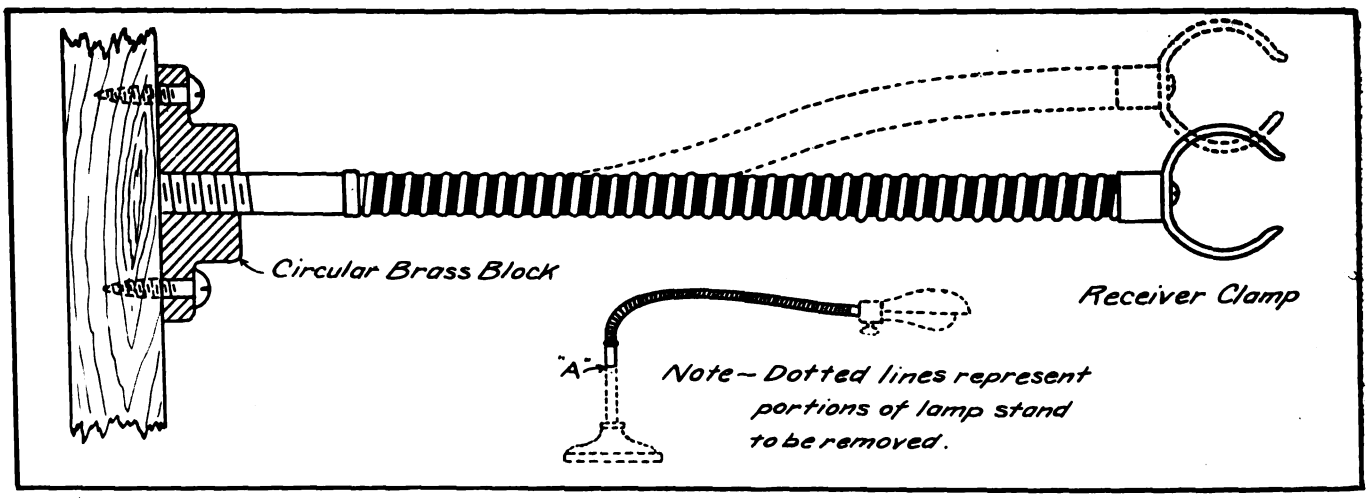

Fig. 3.

This holder is intended to be screwed to the backboard of the telephone or wall, similar to the ones previously described; a few holes may be drilled in the brass or wood block for this purpose. This holder is probably the simplest one to rig up, and gives better satisfaction. It is capable of being put in almost every conceivable position, and is practically rigid when set in position, and will not swing out of the way.

If, with any of these receiver holders the receiver is to be fixed in the clamp permanently, it will, of course, be necessary to provide a weight sufficiently heavy to keep the receiver hook down when not in use.

TELEPHONE EXCHANGE ENGINEERING

ARTICLE XXI.—CONDENSERS (Continued).

By Ray H. Manson, Albion D. T. Libby and Charles A. Simpson.

Voltmeter Method: A high resistance voltmeter is often used for measuring the insulation resistance of condensers.

A voltmeter is connected in series with a battery and the condenser under test, as shown in Fig. 96. The reading obtained is compared with that of the same circuit with the condenser cut out. This expressed in the terms of a simplified formula, will be $I = r\left(\frac{v}{x} - 1\right)$, where I is the insulation resistance in ohms, r the resistance of the voltmeter, v the voltage with the condenser cut out of circuit, and x the voltage with the condenser in circuit.

If a 150 scale voltmeter is used, having a resistance $r = 17{,}500$ ohms (voltmeter resistance is always specified by the manufacturer) and a battery which shows a voltage $v = 140$ volts, then the reading with a certain condenser in series is found to be ½ a volt. Substituting these values in the formula $I = 17{,}500\left(\frac{140}{0.5} - 1\right) = 4{,}882{,}500$ ohms or 4.88 megohms.

It can be seen from these figures that higher insulation resistances would give a smaller value to x which would be difficult to estimate with any degree of accuracy on the regular voltmeter scale. A more sensitive voltmeter and battery of higher voltage would give a larger reading and more accuracy. With a constant battery voltage it would be possible to calibrate such an instrument so as to read directly in megohms, thus making a very convenient commercial method of measuring insulation resistances of condensers.

Galvanometer Method: This means of measuring insulation resistance is essentially the same as the previously described voltmeter method, but the use of a properly designed galvanome-

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ter will allow of very accurate results. Fig. 97 shows the circuit connections. The battery *B*, galvanometer *G*, and condenser under test *K* are connected in series and the circuit closed by pressing the key *A*. The deflection of the galvanometer is that due to the current passing through the insulation or dielectric of the condenser, and is inversely proportional to the resistance. Having obtained the deflection through the condenser, the "constant" of the galvanometer is divided by it and the result is the insulation resistance of the condenser in megohms.

The "constant" of the galvanometer is that deflection which would be obtained were the galvanometer in series with one megohm resistance and the testing battery.

In obtaining this constant the connections are same as before, but a standard resistance is substituted for the condenser, as shown in Fig. 98. The standard resistance taken is for convenience, usually 1/10 of a megohm (100,000 ohms) as larger units would be too bulky and expensive for regular use. The deflection obtained through the standard resistance would in this case be multiplied by 10 to get the constant in terms of megohms. This constant, once correctly obtained, can be used through a long range of tests and needs only to be taken at intervals to check the testing circuit and make sure that the conditions have not changed.

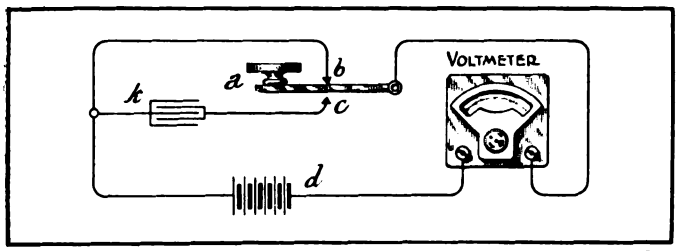

Fig. 96. Voltmeter Method of Measuring Insulation Resistance of Condensers.

An example of the above methods is as follows: In taking the constant of the galvanometer a reading of 90 scale divisions is obtained with a 1/10 megohm standard in series with the testing battery and galvanometer. This would give a "constant" of $90 \times 1/10 = 9$. Now, if the deflection with the galvanometer, battery and condenser connected in series, as shown in Fig. 98, is 4 scale divisions, the insulation resistance of the condenser would be $9/4 = 2\frac{1}{4}$ megohms.

In making galvanometer tests it is often necessary to shunt part of the current from the instrument in order to keep the deflection on the scale. A common form of shunt which can be obtained for any make of testing galvanometer has four steps calibrated so as to allow either 1/10, 1/100, 1/1,000 or 1/10,000 of the current to pass through the galvanometer, and the remainder through the shunt. If the 1/100 shunt was used to bring the deflection on the scale and leave it sufficiently large to give an accurate reading, it would be necessary to multiply the reading by 100 to obtain the true value of the deflection.

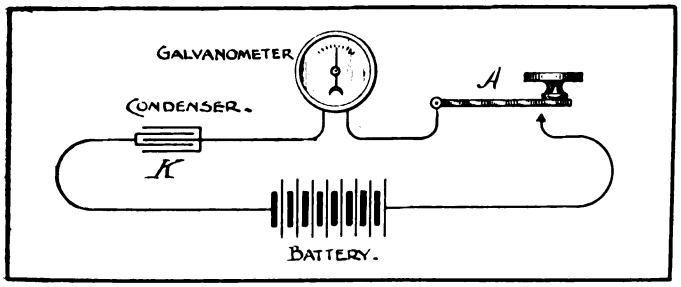

Fig. 97. Galvanometer Method of Measuring Insulation Resistance of Condensers.

If a 1/100 shunt had been used in obtaining the above constant and the same deflection of 90 resulted, then its value would have been $90 \times 1/10 \times 100 = 900$. Now, if the deflection, when testing the insulation resistance of a condenser, was 40 scale divisions, the actual resistance would be $900/40 = 22.5$ megohms.

In making insulation tests by the galvanometer method it is best to put a 1/10 megohm resistance in series with it to prevent the battery current from doing damage should a condenser under test be crossed. Fig. 99 shows this modified testing circuit as well as a four-step shunt placed around the galvanometer for varying its sensitiveness. A short circuiting key *A* is used to shunt out the galvanometer when not in use, instead of opening its circuit. This is the usual wiring for a galvanometer test circuit, the "constant" of the galvanometer and the insulation resistance tests being performed as previously described. The numerical value of the 1/10 megohm resistance can be neglected in commercial condenser tests, but where great accuracy is desired its value should be subtracted from the result to give the true insulation resistance.

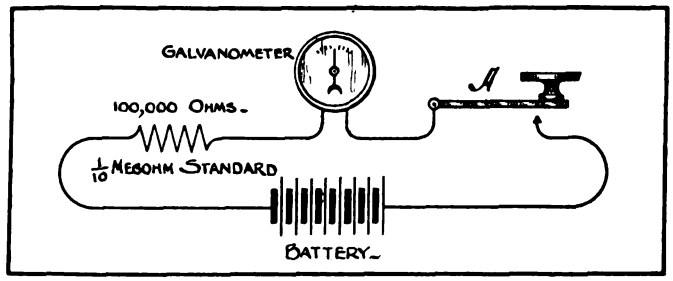

Fig. 98. Method of Obtaining Galvanometer Constant for Resistance Measurements.

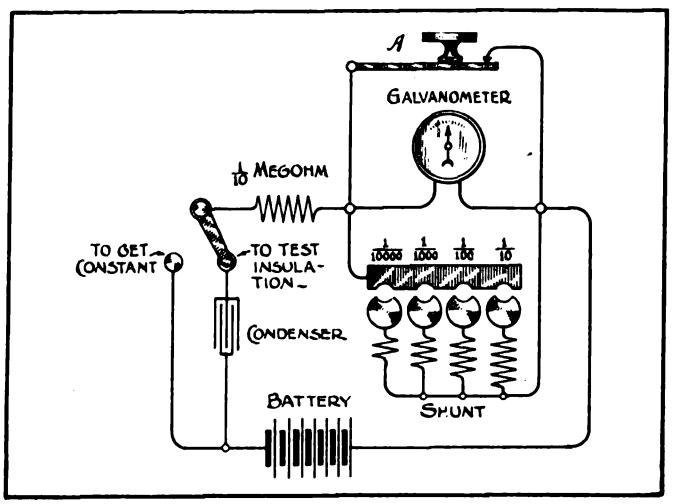

Fig. 99. Complete Galvanometer Circuit Arranged for Measuring Insulation Resistance of Condensers.

MEETING OF TRI-STATE INDEPENDENT TELEPHONE ASSOCIATION.

THE Tri-State Independent Telephone Association held a meeting recently at Westville, I. T. The main points discussed were ways and means for mutual benefit and protection and also for the betterment of local and long-distance service.

H. E. Scovern, manager of the Home Telephone Company, of Joplin, Mo., delivered an address upon "The Value of Toll Lines." A proposition to build a new circuit from Little Rock, Ark., was discussed and it is thought will be put through at an early date. The proposed line will run from Little Rock to Fort Smith to Tahlequah, I. T., through to Fayetteville to Monett, Neosho and Joplin.

Among the telephone men present at meeting were:

H. E. Scovern, manager Home Telephone Company, Joplin, Mo.; H. C. Slaughter and Mr. Berry, North Arkansas Telephone Company, Fayetteville, Ark.; J. I. Potter and D. M. Bostwick, Potter Telephone Company, Gravette, Ark.; W. T. Stehl, Siloam Springs, Ark., Telephone Company; M. M. Collier, Prairie Grove Telephone Company; J. L. Lauderman, Pann Telephone Company, Fort Smith Ark.; A. R. Carroll, Cane Hill Telephone Company; W. D. Wasson, Wasson Telephone Company, Gentry, Ark.; K. G. Comfort and T. A. Cales, Westville, I. T., Telephone Company.

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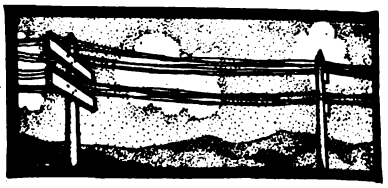
QUERIES

Questions on any subject relating to telephony will be answered on this page.



TREE SUSPENSION.—(481.)

We can save a number of poles in a run in to a subscriber's place from the main line if we suspend the wires to the trees. Will you show us a way to do this? P. F.

A method which is often employed to suspend lines to trees is shown in Fig. 481, and requires but little explanation. In the figure twisted wire is shown running through an insulator suspended from a limb of a tree. The reason for using the insulator is this: If the wire is fastened directly to the tree and it sways in the wind the probability is the wire will break, whereas when the insulator

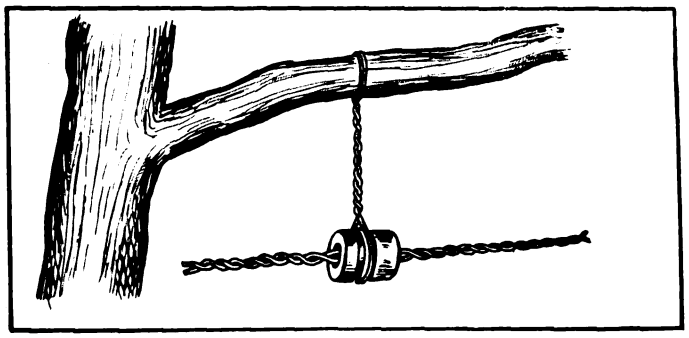


Fig. 481.

is used a flexible support is formed which allows the wire to be held in place irrespective of the movement of the tree.

MAGNETO BOARD CORD CIRCUIT.—(482.)

Will you kindly draw me a diagram of a magneto switchboard? I only want the cord circuit. A. S.

Almost every type of switchboard varies to some extent, and this is true of the cord circuit. In Fig. 482 is illustrated one which will give a good general idea of the requirements. The circuit illustrated is for one-way ringing only.

TWO WAY LISTENING KEY CIRCUIT.—(483.)

Will you please describe what is meant by a two way listening key circuit giving diagram? G. N.

A two-way listening key circuit is one in which the operator in listening in on one cord cuts out the remaining half. Such a circuit is illustrated in Fig. 483. It will be noticed that the operator's set is bridged on to the outside contacts of the key, the cord circuits to the middle contacts and the clearing out drop to the inner contacts. The normal position of the key is with middle contacts closed to the ring off drop. Thus either side of the line is able to call the operator. If the operator wishes to listen in

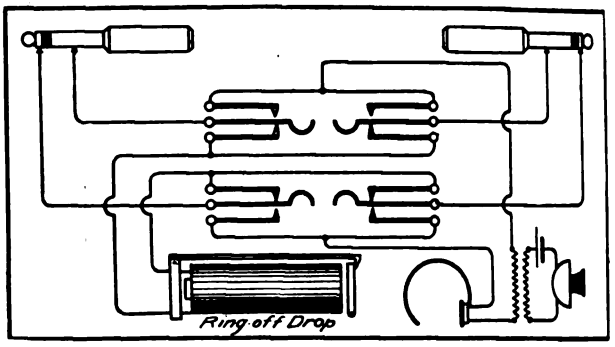


Fig. 483.

she moves the key, opening the circuit between the parties talking and closing one side of the line through to her listening set.

GENERAL QUERIES.—(484.)

We have telephone sets of a small box type placed in hotels with a switchboard. These sets have no induction coil at telephone and are intended to talk long-distance as well as local. How is it accomplished? Where can I find a book that will give information about circuits, etc., of switchboards used by this company? I have a line on my district that has one subscriber, a doctor, which uses X-rays, static, and other apparatus of that style to a great extent; others on the line complain frequently of being noisy. The subscribers are under the impression a swing-gound is the trouble, but if that was the case it would show up in office on signals, etc. I have not been able to catch noise yet, so cannot express my opinion. Could the apparatus mentioned cause trouble? J. W. N.

In reply to your queries, we beg to advise you that we believe you are in error in considering that substation instruments which are not supplied with induction coil are intended to be used on long-distance circuits. Such instruments are not intended for this purpose, the induction coils being intentionally omitted so they cannot be used successfully on long lines.

In reply to your second query respecting switchboard circuits, since you fail to give us the name of the switchboards used by this company, the company to which you refer, it is impracticable for us to reply.

As to the third, unless the subscriber attaches his induction coil or static electrical machine directly to the telephone lines, there would be no probability of his apparatus causing any noise. Your difficulty is probably due either to a grounded line or to a parallel electrical light or power wire.

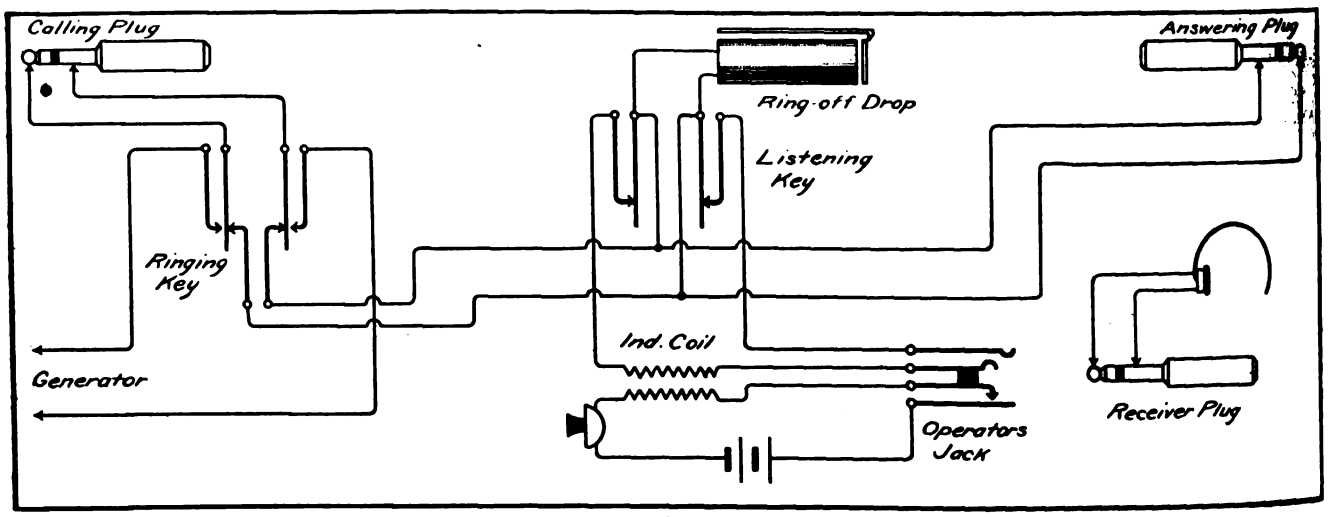


Fig. 482.

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The Telephone in the Courts

Conducted by A. H. McMillan.

Readers are invited to submit questions on any point of Telephone Law. They will be answered and explained on this page.

FRANCHISE TAXES.

On March 4th, 1904, a franchise was issued to the Wm. N. Knotts Telephone Co., of this city, the franchise running for a period of twenty years. One paragraph in the franchise reads as follows: "In consideration for the privileges granted in this franchise the said telephone company agrees to pay into the treasury of the incorporated town of Medaryville, 10 per cent. of the earnings of each telephone maintained." For the first two years Mr. Knotts paid $28 per year. On May 1st, 1903, Mr. Knotts took a partner, and on November 1st he sold out, leaving the plant in the hands of a new company. When the new company went to pay the franchise taxes for 1903 the treasurer demanded the 10 per cent. on the gross earnings. We went before the Board asking a reduction. The Board cut the rate to 5 per cent. from March 1st, 1904, but instructed the treasurer to collect 10 per cent. of the gross earnings up to that time. Can the Board collect? We contend it is too much and no telephone company can exist under such rules or taxation. W. N. K.

THE paragraph in the franchise is perfectly valid, and the town can collect the franchise taxes there provided for. It would be a question of fact whether the per cent. should be taken upon the gross earnings or the net earnings. It would seem the town, having interpreted it for two years to mean net earnings, would not then be allowed to change this interpretation and collect the taxes upon the gross earnings.

FRANCHISE FROM STATE.

THE Laws of New York (Laws 1890, Pg. 1152, C. 566, Sec. 102) gave to a telephone company the right to erect and maintain the necessary fixtures for its wires over any of the public roads and streets within the State. A law passed in 1897 authorized the trustees of villages to regulate the erection of telephone poles and the stringing of wires over the State. The trustees of a village adopted a resolution authorizing a certain person to erect poles and fixtures and to string wires for the telephone system under the direction of the trustees and in their resolution declared that if the work was not completed within the specified time the consent should cease. The work was not completed within the specified time and it was contended that the consent of the village had ceased and the telephone company had no right to demand a right of way in the State. The Supreme Court of New York held that the franchise to use the streets comes from the State and the power to regulate the erection of the poles and wires in the streets of the village rests with the trustees, making it immaterial whether the consent granted by the village had expired or not. The telephone company could therefore demand a right of way although its line was not completed within the time prescribed in the resolution of the village trustees.

The Court held further that the telephone company should be permitted to acquire in condemnation proceedings an easement for its poles and wires in the street.

New Union Telephone Co. *vs.* Marsh 89 N. Y. 79, 96 App. Div. 122.

EXCAVATION IN HIGHWAY.

A SUIT was brought against a Telephone Company for damages for failure to safeguard with due care an excavation made by it in a public highway. The trial court was requested by the defendant to charge the jury: "That the duty of the defendant was to exercise reasonable care in protecting by fence or guard its manhole, and that it was not, in the exercise of this duty, necessary that it should provide the best appliances or guards, but only such appliances and guards as were well known and in general use." The Supreme Court held that this request correctly stated the law and should have been charged as applicable to the case in hand. Each of the propositions contained in the request was pertinent to the issue that had been tried, and the second of them was especially pertinent. The rule of law stated was applicable to the conduct of the cause within the issue that was submitted to the jury, and hence when the defendant requested the court to instruct the jury upon this point, it was the defendant's right to have the law correctly stated. Van Vechten vs. N. Y. & N. J. Telephone & Telegraph Company. 58 A. 1096.

A QUESTION FOR THE JURY.

WHERE the person using a highway was injured by coming in contact with the telephone wire, which had fallen on the wire of an electric railway, which used the same supports for its wires as did the telephone company, and such detached wire became heavily charged with electricity, in an action for the injuries it was a question for the jury whether the telephone company was negligent in failing to properly guard its wire and it was proper to deny a motion to take the case from the jury and render a judgment for the telephone company.

Burton Telephone Co. *vs.* Gordon, 25 Ohio Cir. Ct. R. 641.

RECKLESS HOUSE MOVING.

AN illustration of the dangers and damage that may arise when house-movers interfere without authority with wires belonging to telephone and other electrical companies is found in the recent case of Nagle vs. Hake, decided by the Supreme Court of Wisconsin.

Hake, a house-mover in Milwaukee, was moving a building along Walker street, and to gain passage for it took down an unused telephone wire belonging to Julius Andrae & Sons' Co. This wire, as it crossed National avenue at the intersection of Walker street, hung a few inches above an electric-light wire heavily charged with electricity and belonging to an electrical railway company and protected only with a coating of weather insulation. The plaintiff, a boy about eight years old, lived with his parents in a house near the intersection of the above-mentioned streets. When the house-mover reached the wire with his building he cut it, and, rolling up the end for some distance in a coil on his arm, he hung the coil on a nail in the side of the house where the boy lived. The boy accidentally touched the coil and was severely burned. It was found the wire had sagged where it crossed the street until it rested on the electric-light wire and that the insulation of the latter wire had worn off. Andrae & Sons were made joint defendants, but the suit was discontinued as to them upon their paying the father of the plaintiff $500 and receiving a release for the damages claimed by the father against the company.

From a judgment in favor of the plaintiff the defendant appealed. The Supreme Court held that the release of the father and the discontinuance of suit against Andrae & Sons did not release the defendant. It also held that plaintiff had made out a case and was entitled to recover. Numerous questions of minor interest as to testimony and instructions are discussed.

Nagle vs. Hake (Wis.) 101 N. W. 409.

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RESPECTING CONTRACTS WITH BELL COMPANIES.

THE value of Independent organization is having a fine illustration at Middletown, New York. Inspired by its success in seducing the Glen Telephone Company, operating at Johnstown and Gloversville, New York, into a so-called operating contract, the Hudson River (Bell) Telephone Company laid out a scheme for capturing the Orange County Telephone Company at Middletown on similar terms. Immediately this fact leaked out, a hurry call was issued for a meeting of the Independent Telephone Association of Orange and Sussex Counties. This brought to the support of the loyal men in the Middletown company, the support of every Independent telephone operator in the territory, and the weak-kneed stockholders were bombarded with facts and arguments that proved most convincing. Among other exhibits was a letter written by D. A. Reynolds, vice-president and general manager of the State Line Telephone Company, that is operating most successfully in New York State.

This letter, addressed to W. C. Ramsdell, secretary of the Orange County Company, who is and was strenuously opposed to the designs of the Bell Company, makes such a strange presentation, that the editor deems it good policy to reproduce it in full in this column. After a preliminary introduction, Mr. Reynolds says:

> There is one feature in the proposition you have received from the old-time monopoly that would seem to require an explanation, to say the least. For years you have been able to successfully manage your own affairs, and have built up a business of which you may well feel proud. All this time you have been without long-distance connection, but notwithstanding this handicap, you have shown your ability to rival the monopoly and do for your city what they never would do—give good service at reasonable rates. You now have the respect of your people who look at you as their deliverer, and who will doubtless continue their support in ever increasing proportion. You have forced the monopoly to their knees and now that you nave them at your mercy, why surrender to them?
>
> If they had loved you in the past as they love you now, why did they not offer terms before? Is it because they see the handwriting on the wall? No one knows better than they, how near you are to metropolitan connection, with long-distance lines connecting you with 7,000 other Independent telephone companies who have remained Independent in spite of the most alluring offers and magnanimous promises, made only to be broken. They see the same conditions confronting them here in the East, as they had to meet in the West, where the Independents number as high as five to their one, and knowing that the time is short when they must leave the field to the Independents, they are grasping at the last chance to drag you down with them. They cannot hope to make anything direct in Middletown, by the terms they have offered you, but their indirect benefit is far-reaching. If they can tie your hands and take you out of the Independent column, even without momentary benefit, they have added your number of subscribers to their list, strengthened themselves in other localities where they are being pressed as badly as you have been pressing them, and made it impossible for the other Independents to communicate with Middletown until another franchise is granted and another system established. You can safely calculate that any contract they will offer will prove fatal to your further growth, as they never embrace except to ruin.
>
> It is not wisdom for your stockholders to conclude that by walking into the parlor of the monopolistic spider, they will avoid competition. On the contrary, they will do the very opposite. You now have competition whipped to a standstill, and it will only require independence for a short time in order to have the field entirely to yourself, with possibly a single Bell pay-station on their long-distance lines. On the contrary, if you accept their terms and lose your identity, Independent competition will spring up and you will have to compete against local influence and a much wider field, and it would be very strange if some of your own stockholders did not leave your organization and join a ***real genuine Independent*** company.
>
> An illustration of this kind may be cited at Detroit, Michigan, where the Michigan Bell Company offered practically the same terms they have offered you. The Citizens' Company refused it, but William and John Holmes, two of their directors, entered into an intrigue with the monopoly, got hold of a majority of the stock and sold out the plant at a profit of nearly 200 per cent. Immediately another franchise was granted by the city and Detroit is now building a thoroughly modern system, with men back of the enterprise whose honor is above price. The Holmeses, it is needless to say, are out of the telephone business and nearly out of all other business, as they are regarded as men without honor and to be ostracized in all legitimate transactions.
>
> There are a number of such instances in the West, where the monopoly has been driven to the wall, and I cannot call to mind a single city, where the Independent has succumbed to the wiles of the monopoly, where an Independent company did not spring up in its place and drive the unholy alliance out of existence.
>
> To-day, Michigan has 86 Independent telephone companies operating 90,000 telephones, where the Bell had 13,432 before competition. The old company has been guilty of every crime known to the business world for eight years of competition, and finally succumbed to the inevitable, and was closed out the first of the present year by the receiver, with a loss to its stock and bondholders of over ten million dollars. Ohio has twice as many Independent telephones as are operated by the Bell in that State, Indiana two and one-half times as many, Illinois three times as many, Iowa five times as many, while not a single Bell company in twenty-six Western States and Territories has paid a dividend in the past three years. Over 100,000 Independent telephones have been installed in the State of New York in the last two years, and they are increasing in geometrical progression. The Bell Company cannot meet this growth and they are in worse shape in other parts of the State than you have made them in Middletown. They cannot longer sell their securities to meet competition by installing free telephones, for they are now capitalized for from $300 to $900 a telephone, and free telephones do not pay dividends.
>
> They are like an old, decrepit man worn out by excesses and now seeking new blood to keep them alive. They have, in many parts of the country, ceased to be regarded as legitimate, and the manipulations of the Erie Company is only an example of their tactics. How any self-respecting man, as a director of a legitimate business enterprise, can have anything to do with them after knowing that history, is beyond my understanding, and if he does not know the history, he should inform himself before bringing reproach upon himself and his company. It is not safe to play with fire, even if you think you are getting the long end of the poker. Remember the opposition has everything to gain and nothing to lose. You have won your battle, why surrender your honors? You know from

THE BELL AND THE MIDDLETOWN COMPANY.

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MR. VERMILYA'S SCATHING OPINION.

I have examined with considerable care the proposed contract to be entered into between the Orange County Telephone Company and the Hudson River Telephone Company, and, after a full discussion with you in reference to the conditions under which your company operates, I am constrained to say that the contract is pregnant with litigation and it assuredly limits the development of any telephone business by your company.

In the first instance, you are limited to the territory included in the limits of the city of Middletown, and are practically cut out of territory now controlled and operated by you. You are also practically cut out of any arrangements that may exist between you and the other companies now operating in Orange County.

The contract is indefinite as to the system that you shall maintain and equip under paragraph fourth, and more particularly in reference to any further equipment that the River Company may demand of you. I am not referred to any rights, privileges and facilities which the River Company has by contract and otherwise with any connecting companies, and I should advise a very careful examination of these contracts in order that it may be determined just what rights the River Company has.

The last clause in paragraph five is very indefinite as to the number of toll lines that the River Company shall maintain. It would seem that the contract should be changed and a definite number of toll lines installed in proportion to the number of instruments in use by your company.

Paragraph six absolutely prohibits your operation with the other Independent telephone companies in Orange County, which is herein above stated.

The agreement as to the delivery of sets and the installation of the same by you is impracticable, for the reason that the deliveries are contracted to be made by the River Company within the same time that you are under contract to install them, and if the River Company should delay the delivery until the latter days of their term, it would be an impossibility, as I am advised, for you to install within the time agreed upon.

As a business proposition, the installation of Bell sets would seem to me to be bad. I am advised that the receivers and transmitters are purchased at about $3, and it is true that you are allowed that sum for those at present you have. On the other hand, it will be necessary to take them all out and install Bell sets. I am not advised definitely as to the life of those instruments, but at $1.20 per year they will very soon come out to far more than $3, and even then you will not own the instruments. If, for instance, the life of the instrument is ten years, for each new instrument installed the cost will be $12, as against $3 now, and for all replaced the cost will be $8.40, as against $3, and your assets will necessarily be diminished by the number of telephones you now have multiplied by their cost, with nothing to counterbalance this loss except a continuous charge.

Further, as a business proposition, it is for you to determine whether or not the increased toll service, by virtue of your connection with this company, will sufficiently counterbalance the charges that you will have to pay, not only in installing further switchboards, lines, etc., but also in paying the rental upon the so-called sets to make it profitable. In other words, if your tolls amount to 4,000 messages per month incoming and outgoing, which would give you $120, under the agreement, it might be necessary for you to install further equipment, and it would certainly be necessary to pay the $.10 per month per set, which now amounts to $100, and take into account the depreciation and interest upon investment, it would hardly seem that the apparent profit of $20 per month would not be more than used up.

Taking all this into consideration, together with a close analysis of the contract, which shows everything of benefit to the Hudson River Co., and nothing of benefit, and certainly much of detriment, to the Orange County Telephone Co., in that it is limited in its development, I should certainly strongly advise against an execution of the contract.

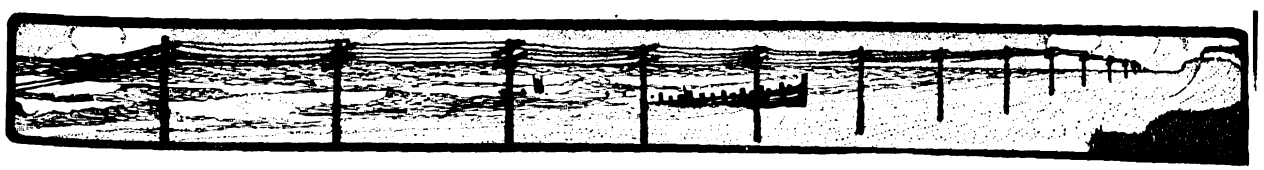
intuition that they have an axe to grind or they would never make you the offer they have, and if you accept it, you are dead sure to get that axe in the neck.

To-day your company is looked upon everywhere as one of the Independents whose Board of Directors are composed of men of honor, and it has been an inspiration to others struggling for relief from the exactions of the monopoly. The same confidence and respect your stockholders and directors have enjoyed at home, has spread to the entire Independent telephone field, and you are regarded as one of the bulwarks in the Independent ranks. You occupy a position which is known to be impregnable, and every one knows that you have the monopoly under your feet. Now, if you will surrender for what may appear for the moment as a temporary advantage, what can you expect of those who have been building on their faith in your integrity. There is an element known to the business world as *integrity* which is regarded among men of honor as beyond price, and I am not prepared to believe that your stockholders and directors will disregard this priceless heritage and surrender the exalted positions they have gained in the Independent field, when they come to make their final decision.

Little remains to be said in addition to Mr. Reynolds' review of what happens to Independents who ally themselves on any basis with Bell telephone companies. But there is a further object lesson in an analysis of the contract that was submitted by the Bell people to the Middletown company. Such an analysis was made by Mr. Frank B. Vermilya, of the New York City law firm of Sumerwell, Shoup & Vermilya, to whom Mr. Ramsdell submitted this contract. Mr. Vermilya's opinion demonstrates conclusively that even in its simplest dealings, the Bell is tricky and unreliable, and that it always lays it traps so that in the end it is certain to engulf any Independent company that may be short-sighted enough to enter into dealings with it.

The final outcome of the Bell's effort to entrap the Middletown company will not be determined until January 19th, when the matter will be submitted to the sotckholders at their annual meeting. Unless the majority of the stockholders are unusually stupid, it should not be difficult to forecast the result.

Not alone decency and good citizenship, but ordinary business foresight must dictate a course that will steer clear of any alliance with the Bell. Any company that has grown as has the one in Middletown surely has no sound commercial reason for entering into an arrangement with a competitor when it has virtually driven it out of business. When it began operating in Middletown in 1897, the Orange County Company had 296 subscribers. To-day it has 1,000.



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IN THE OPERATING FIELD.

MEETING OF PENNSYLVANIA ASSOCIATION.

AS the result of a recent meeting of the Pennsylvania State Independent Telephone Association, held in Philadelphia, assurance was given that within the next three months direct connection will be had between this city and Kansas City and St. Louis over the lines of Independent companies. This marks another step in the progress of the Independent companies, inasmuch as these points, when connected, will be the farthest Western connections of the companies that are fighting the Bell Telephone Company.

The Eastern Traffic Association, which is composed of representatives from all Eastern Independent telephone companies, held a meeting and the universal tolls which have been prevailing for long-distance business over all the lines the past year were ratified. The States represented included Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia and Ohio. Of this number the last three sent representatives for the first time. The Pennsylvania Association has been in existence three years.

INTER OCEAN EXTENDS LONG-DISTANCE LINES.

THE Inter Ocean Telephone Company, of Buffalo, N. Y., is at the present time engaged in a number of extensions to its long-distance lines that will eventually connect with Independent circuits, reaching points as far distant as St. Louis.

Buffalo is now in touch by that system with all the towns between Lake Erie and the Hudson River. The Southern Tier towns as far East as Binghamton, including Watkins and Penn Yan, as well as Hornellsville, Olean, Salamanca and Jamestown, are speedily to be united with the same circuit. Lines are up between Buffalo and Erie which already give an excellent service with Ohio and Western Pennsylvania points.

HOME COMPANY OF BLOOMINGTON, ILL., ISSUES NEW DIRECTORY.

THE Home Telephone Company, of Bloomington, Ill., has recently issued a new directory, dated December 1, which illustrates the growth of this progressive company. Between the time of going to press and the date of issue there were forty-one new subscribers to the local exchange. Besides the subscribers to the Bloomington exchange there are lists for fourteen surrounding towns and villages, including a list of McLean County toll stations. This company gives direct connections over copper metallic lines of the Interstate Independent Telephone and Telegraph Company to over five hundred towns in Illinois, Iowa, Indiana and Missouri. The McLean County Telephone Company, a list of whose stations is given, reaches 158 different toll points direct and a much larger number of more distant points over other companies' lines.

MAYOR OF LEBANON (IND.) VETOES BELL FRANCHISE.

MAYOR ROSS, of Lebanon, Ind., has vetoed the ordinance recently passed by the council granting the Central Union Telephone Company a franchise to do a local business in Lebanon. The mayor objected to the ordinance because it failed to limit the price of the service, and is opposed to placing the people at the mercy of a greedy corporation. The people are very well satisfied with the service of the local company, and the council is being criticised for granting the ordinance. The quiet manner in which the ordinance was put through is regarded with suspicion. Another ordinance will be introduced and a lively fight is anticipated.

FRANKLIN (IND.) OPPOSED TO BELL.

THE Central Union Telephone Company has asked for a franchise to do a local business in Franklin, Ind., and the application has aroused a storm of opposition. The Franklin Telephone Company has over 800 telephones in operation, and patrons talk all over the county without toll or fee. The rate is $1.00 and $1.50 a month for residence and business telephones, respectively. The local company erected a substantial building and occupied the field at a time telephones were not so much in demand, and is now giving patrons connection with seven Independent switchboards, together with many cities in the State. The granting of a franchise and establishing of an opposition service is opposed by the citizens as unjust, unnecessary and uncalled for. A lively fight is anticipated when the ordinance comes up for passage.

MAYOR OF EVANSVILLE, IND., CALLS MEETING.

MAYOR COVERT, of Evansville, Ind., has called a meeting of the city council, city officials and representatives of the Cumberland Telephone Company with a view of effecting a compromise agreement whereby the telephone question can be settled. Mayor Covert has carefully avoided hinting as to what he expected to be the final outcome of the matter or as to how he would stand when the matter was brought up for discussion. The company, it is understood, has made overtures for a settlement of the telephone question, and it is for the purpose of considering these overtures that the meeting was called. The public will be invited to the meeting.

INDEPENDENT EXTENSION IN THE STATE OF WASHINGTON.

PLANS for extensions that will cost $300,000 and which will practically cover the entire Puget Sound country have been perfected by the Independent Telephone Company, of Seattle, Washington.

It is the idea of the corporation to gradually invade the entire Pacific Coast field for long-distance service, and to this end lines are about to be constructed to several points to the northward of Seattle. The plans that are at present in process of consummation provide over 100 miles of additional lines for the company.

A short time ago the company acquired a controlling interest in the Citizens' Independent Telephone Company, at Port Townsend, and recently perfected arrangements whereby the wires of the Seattle company could be connected with those of the Angeles Telephone and Telegraph Company, at Port Angeles. The former company's lines have a long-distance connection with Port Hadlock, Seguim Junction, Glinn, Fort Washington and several farmers' lines. The latter has an exclusive field at Port Angeles with over 300 subscribers.

The Independent Telephone Company is preparing to build to Dungenness west to connect with the Port Angeles exchange, and from there south to Seattle. The material is already purchased to build long-distance lines from Port Townsend here and to connect Port Angeles and Port Townsend.

The line from Seattle to Port Angeles will be partly cable, running across the bay at Bainbridge Island.

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TRI-STATE WINS CONTRACT OVER BELL.

THE Tri-State Telephone Company, of Pennsylvania, has closed a contract with the West Penn Railways Company for the installation of the Tri-State telephone in the general offices at Connellsville and all over their system. The contract will go into effect on January 1, 1905. This will result in the supplanting of the Bell telephones. The West Penn Company has had a private exchange in its general offices in Connellsville, and the resident telephones of officers and employees have been about equally divided between the Bell and the Tri-State.

The West Penn Company decided to adopt the Tri-State, as it has been found to be up to the standard, both for long distance and local service. Beginning January 1 all its offices will be equipped with long-distance Tri-State telephones. Besides all power houses and substations from Pittsburg, McKeesport, Jeannette, Greensburg, Irwin, Manor, Youngwood, Scottdale, Connellsville, Dawson, Uniontown and McClellandtown, as well as residences of all officials and employees.

At the start about 80 telephones will be installed, but this number will be increased from time to time, as business demands.

FINE SHOWING OF CUYAHOGA.

THE Cuyahoga Telephone Company, of Cleveland, in its November statement, shows a gross increase of $18,121.41, and an increase in net earnings of $6,765.43 over the corresponding month of last year. This is an exceptional showing and speaks well for the prospective value of this company's securities. It is noteworthy in connection with this statement that all the other subsidiary companies of the Federal Telephone Company, of Cleveland, show net increases in every instance but one, and that is due to a large amount of construction work done during the past month.

BIG DEMAND FOR INDEPENDENT TELEPHONES IN DUBUQUE.

PRESIDENT VIC STEVENS, of the Dubuque, Iowa, Telephone Company, states that there is a heavy demand for the telephones of his company, which has connections with the Tri-State and Inter-State Telephone Companies. This demand comes from business men and farmers in the southern part of Grant County, Wis., and the northern part of Jo Daviess County, Ill., and from farmers in the intermediate territory. Among the places where telephones have been put in and connection made with Dubuque, and places in Grant and Jo Daviess Counties are the Three Mile House, Happy Corners, Fairplay and Lake Frentress. A gang of men is now at work in Cuba City and vicinity, installing instruments, and others will be put to work as soon as possible in Galena and other towns in the northern part of Jo Daviess County, so that the whole territory may be covered as soon as possible with Independent lines.

SOME TELEPHONE FACTS

FOR YOU TO REMEMBER.

75 percent of telephone subscribers NEVER talk over a TOLL line.

97 percent of telephone subscribers NEVER talk outside of a radius of 35 MILES from HOME.

SOUTH BEND and MISHAWAKA is the commercial center of 95 percent of all telephone users within the 35 mile radius of these cities.

The INDEPENDENT Telephone Companies have 20,000 subscribers in this territory, and therefore do 95 percent of the telephone and toll business in this commercial territory.

The Bell Company has about 1500 telephones in the same territory and therefore does ONLY 5 percent of the telephone business of South Bend and Mishawaka.

The Home Telephone Company reaches 3500 subscribers in St. Joseph county.

No. of Telephones Installed.	Home Phones.	Bell Phones.
In the State of Indiana	155,000	45,000
13th Congressional District	10,000	1,383
St. Joseph County	3,354	1,030
South Bend	2,862	900
Mishawaka	492	125

The above statement is the gist of a circular issued by the South Bend Home Telephone Company, of South Bend, Indiana, showing the remarkable development made by the Independent telephone movement in Indiana. As a statement of facts, it is clear and concise, proving beyond a question of doubt the superiority of the Independents over the Bell.

As an aid to those Independent Companies which are menaced by the Bell interests, THE AMERICAN TELEPHONE JOURNAL *has had the above statement reproduced, and will be pleased to furnish electrotypes at cost (80 cents each) to be used for printing circulars, or in any other way they may think best. To those who may desire to get the circulars printed without the trouble of having an electrotype made,* THE AMERICAN TELEPHONE JOURNAL *will quote a price of $1.50 a thousand, f. o. b. New York.*

PRINCETON, IND., INDEPENDENT CO. TO ERECT NEW BUILDING.

THE Independent Telephone Company, of Princeton, Ind., will erect a new exchange next spring. The specifications call for a two-story building of pressed brick with Bedford stone trimmings. Additions will be made to the switchboard and increased terminal facilities will be installed. The cost for the building will be about $8,000.

The long-distance service of the company was greatly augmented recently by the completion of a circuit to connect with the Knox County Home Telephone Company, of Vincennes. This connection gives the company long-distance service to all the important points in Ohio, Indiana, Illinois, West Virginia, and Pennsylvania, and as far south as Louisville, Ky.

Ultimately this service will be extended to reach points in Kansas, Missouri and other Western States.

COLUMBIANA CO. INSTALLS NEW SWITCHBOARD.

A NEW switchboard is being installed in the plant of the Columbiana Telephone Company and the officers of the Federal Company in Cleveland report that the outlook for that company during the next year is very bright. When the plant was first put in the rates were made too low and the officers decided to raise them. Some of the business men in the territory objected, and there was considerable trouble for a while. The company now has its new rates firmly established and nearly as many telephones as it had before and is increasing rapidly.

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IN THE MANUFACTURING FIELD

"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS."

NEW DEAN PORTABLE DESK STAND.

THE new desk stand manufactured by The Dean Electric Company is a radical departure from the time-honored method of construction. It is made in the most substantial manner possible, the inner framework being pressed and drawn from heavy sheet steel, instead of the usual castings. The external design is along graceful and simple lines, while the finish is beautiful and lasting. The upright is covered with a thick, polished, hard-rubber tube and all of the remaining exposed portions are heavily nickel plated.

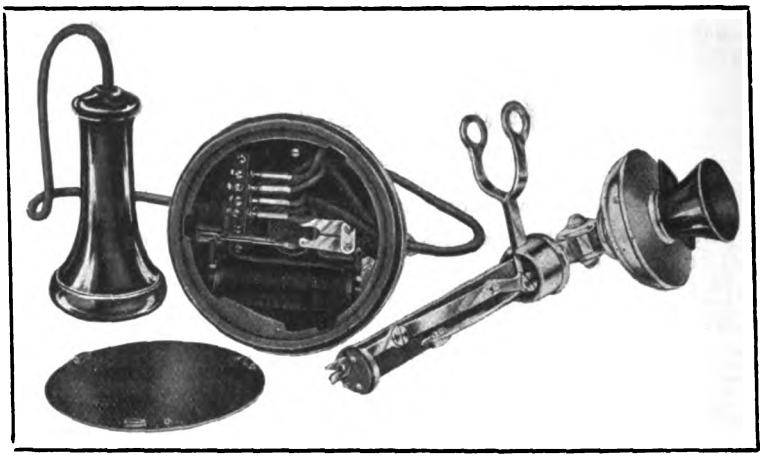

Fig. 2. Dean Desk Stand Opened as Shown Without the Use of Tools.

The hook switch is one of the most novel features of the Dean desk stand. The contact springs, which are of the same as those used in the standard Dean hook switch, are mounted edgewise within the base so that the platinum contact points are open for inspection by simply removing the base cover. The motion of the hook proper is transmitted to the contact springs by a simple intermediate lever, which, together with its actuating or main spring, are mounted on a steel frame. This steel frame is locked in place within the upright tube by a spring catch, which can be released from the bottom of the stand when the base cover is removed. The transmitter is mounted on the top of this steel frame and its circuit carried to spring contacts within the base, thus allowing the entire mechanism concealed within the upright to be removed without disturbing the wiring. The base cover is held in place by a bayonet lock and spring catch, thereby making it possible to quickly open up the stand so as to get at all of the working parts without the use of tools, as shown in Fig. 2. The cushion protection, provided on the bottom of the stand, is left in place after the base cover is removed, so that there is no danger of marring the desk woodwork.

Fig. 1. Dean Desk Stand.

An entirely new feature incorporated in the Dean desk stand is the interchangeable circuit plate. All of the talking circuit apparatus, excepting the transmitter and receiver, is mounted on a metal plate and completely wired so as to form a unit, as shown in Fig. 3. These units are interchangeable and are arranged for local battery and common battery circuits, the remainder of the desk stand, excepting the transmitter, being the same for both services. Thus, in making a change, it is only necessary to replace the circuit plate with the one containing the desired new circuit. Special tools are not necessary, as the plates are complete in themselves and are held in place by three screws. Exchanges contemplating a change from local to common battery at any future time will fully appreciate this new feature.

All of the parts entering into the circuit of the Dean desk stand are concealed and thoroughly insulated, so that there is no chance for the subscriber to receive a shock while using the instrument.

The steel framework and other parts subject to corrosion are carefully plated with copper. The base is provided with a nickel plated, heavy brass covering which will not become dented by severe use. The new Dean "balanced Wheatstone bridge type" common battery talking circuit is especially adapted for mounting in a desk stand, as, outside of the transmitter and receiver, it contains only a single coil. The hook switch has only one contact, while the cord necessary to connect the stand to the desk set box requires only two conductors. All of the circuit apparatus, excepting the transmitter and receiver, are mounted on a circuit plate, as shown in Fig. 3, which is interchangeable with the local battery circuit plate. The use of a one-point hook switch and a two-conductor cord reduces the maintenance of this stand to a minimum.

The local battery or magneto stand is arranged similar to that of the common battery stand the induction coil and contact springs mounted on a circuit plate, which is interchangeable with that of the common battery stand.

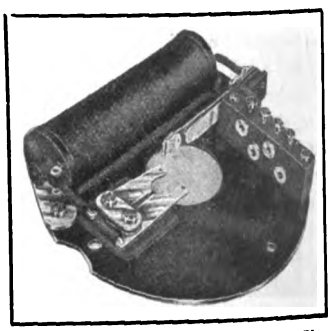

Fig. 3. Interchangeable Circuit Plate Mounted on Base of Desk Stand and Arranged for Either Local or Common Battery.

The bell box used with the common battery stand is made from pressed steel with an enamel finish. It contains only the signaling apparatus, consisting of a ringer and condenser, as all of the talking apparatus is located in the stand. The magneto bell box is made from quartered oak or walnut and contains the ringer and generator.

THE MILLER ANCHOR COMPANY, of Norwalk, Ohio, reports large sales of its anchors to the following companies: The Cumberland Telephone and Telegraph Company, Nashville, Tenn.; The United States Long Distance Telephone Company, Cleveland, Ohio; and the New York and New Jersey Telephone Company, New York. This is sufficient evidence of the good qualities of this type of anchor, since the companies above mentioned

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FOR SALE

Advertisements under this head, $1.00 for 25 words or less for each insertion. Prepaid.

FOR SALE.—I have a telephone proposition which will interest any one of means who cares to investigate. This property is in fine condition; located in excellent field and paying. Write me at once. Box 270, care of AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 270

EXCEPTIONAL offer—I have a three-fourths interest in a telephone stock company owning four good exchanges and 1,000 miles of toll and farmer lines. About 1,000 telephones in operation and sufficient territory for that many more. Stock outstanding amounts to $50,000. Has earned over 30 per cent. in past two years. No competition; $25,000 cash and balance long time; low rate. Address Box 291, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 291

FOR SALE—Two 100-drop switchboards, as good as new, manufactured by the Telephone Mfg. Co., of Sumter, S. C. Also one 200-line distributing board with lightning arresters made by the same firm. Reason for selling, too small for our use. Address La Grange Telephone Exchange, La Grange, Ga. 305

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Advertisements under this head, 25 cents for 25 words or less for each insertion. Prepaid.

WANTED—To meet an investor with capital with a view to developing an automatic telephone which can be made at one-third cost of present automatic systems, also other telephonic devices. Exceptional opportunity. No agents or promoters need apply. Apply Box 272, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 272

WANTED—Position as manager with a first-class company looking for a hustler. Experienced particularly in toll and long distance work, including clearing house methods, and line construction. Familiar with every detail of telephone work. Executive ability; excellent references. Address Box 285, care THE AMERICAN TELEPHONE JOURNAL, New York. 285

WANTED—Telephone salesman. One familiar with exchange material as well as interior systems. Address Box 299, care AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 299

WANTED—Position as telephone salesman with reliable manufacturer. Familiar with all apparatus. Have had twelve years' practical telephone experience. Bonded by a reliable surety company. Address Box 306, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 306

WANTED—To purchase interest in telephone system in Illinois, Iowa, or Missouri where party could be manager. References required and given. Address Box 307, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 307

WANTED—To hear who has best telephone proposition to offer, where I can take interest in the business, and interest some local capital. Address Box 308, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 308

WANTED—To demonstrate to you that I am the kind of a manager you need. "If you are from Missouri I can show you." Correspondence solicited. Best of references. Address Box 309, AMERICAN TELEPHONE JOURNAL, 116 Nassau street, New York City. 309

Cross-Arm Braces

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JAPANNED
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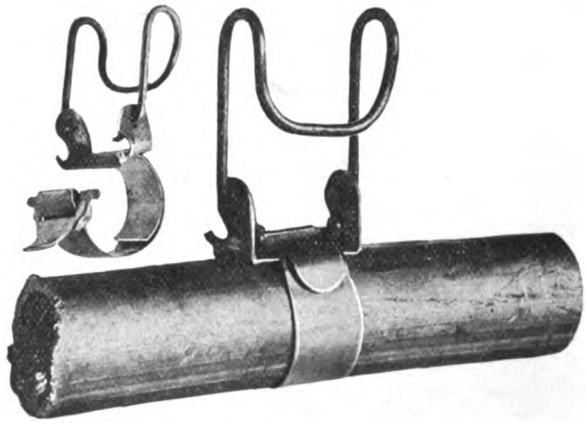
We are manufacturers and carry a complete assortment of all sizes in stock, and can make prompt shipments.

BUFFALO STEEL CO.

TONAWANDA, N. Y.

The Hallett Iron Works

96 W. Polk Street, Chicago, Ill.



This is a Good Hanger

It sticks, stays hooked, can be used several times and is perfectly adjustable.

WRITE US FOR FREE SAMPLES

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IN THE MANUFACTURING FIELD

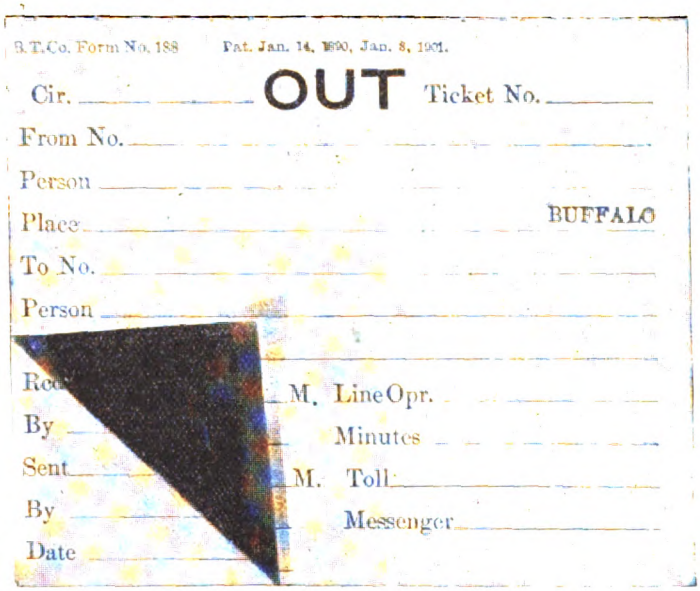
"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

are among the largest in the industry. The Miller Company will be pleased to furnish descriptive matter and prices upon application and to give all further information desired.

MANIFOLDED TOLL TICKETS.

ONE of the most irksome problems which faces the general manager is the constant necessity of adjusting questions relating to the toll line charges. Customers are exceedingly prone to question the validity of the charge, both as to the time spent in conversation and the rates assessed. The labor to which the operator is subjected in the making of toll line tickets is an important item, and unless duplicates are preserved there is no means of substantiating bills for service.

The General Manifold Company is placing upon the market a device which will be welcomed as an improved solution of the problems which have thus risen. The toll ticket consists of a piece of paper which is divided in the center by a perforated line, so that it may readily be torn into two pieces, and the halves are printed in duplicate bearing the same legend. On the reverse side of the left hand half the ticket is carbonized, so that when the operator writes upon the outside of the sheet, a carbon copy is automatically made upon the inside. At the end of each day the toll tickets may be collected and torn in two, one copy being sent to the subscriber while the fac-simile is retained by the telephone company. By this means an original autograph copy of all messages transmitted is obtained with no more expenditure of labor than is necessary to make the original ticket.



Manifold Ticket made by General Manifold Company.

THE CARBOLINEUM WOOD PRESERVING COMPANY, of Milwaukee, Wisconsin, has issued a pamphlet describing "Avenarius Carbolineum Wood Preservative," a wood preservative of the highest grade. The pamphlet contains letters of recommendation from some of the largest users of poles in the country, including railroad, telephone and telegraph companies. A comparative illustration of the value of this preservative is shown in two pictures of wooden logs, one of which, after twenty years' use, is still in good condition, having been treated with this preservative; the other, although only in use five years, is badly decayed where it was below ground. An analysis of the preservative is given, together with directions for its use. This preservative will prevent checking and warping of woodwork, dry rot, and decay of any sort. It is easy to apply and does not contain volatile or dangerous ingredients. It is a strong antiseptic and is free from all poisonous matter of any description. The company will furnish more detailed information upon request, together with this pamphlet.

THE T. & A. SELECTIVE CALL COMPANY, of Geneseo, Ill., manufacturers of selective call apparatus for relay party lines, has engaged Mr. S. G. Fletcher as shop superintendent. Mr. Fletcher has had a wide experience with numerous tool companies in Chicago and vicinity, and is eminently fitted for the requirements of his responsible position.

COOK GETS COLUMBUS.

FRANK B. COOK has received from the Automatic Electric Co. an order for a complete distributing and protector frame for the exchange of the Citizens' Telephone Co., at Columbus, Ohio. The capacity of the frame is to be 8,100 pairs, and it will be equipped with 8,000 pairs of Cook's No. 444 self-soldering protectors. This installation is especially worthy of note, as it is the largest protector board that has been installed for several months. Cook is particularly pleased with the order from the fact that it shows the manifest confidence of the largest exchanges and manufacturers in the country in the superiority of his self-soldering protectors.

Other orders which Cook has received from the Automatic Electric Co. are as follows: for the Delaware Telephone Co., Wilmington, Del., a type L frame with a capacity of 2,500 pairs, equipped with 2,000 pairs of No. 444; for the Solvay Process Co.'s System, Syracuse, New York, 200 pairs; for the Home Telephone Co., Los Angeles, Cal., a 900-pair addition to the East Exchange; Home Telephone Co., Santa Monica, Cal., type L frame, 500 capacity, equipped with 360 pairs; for the Ocean Park Exchange, 500 pairs capacity, equipped with 300 pairs; for the Sawtelle Exchange, 300 capacity, equipped with 160 pairs.

THE B. R. ELECTRIC AND TELEPHONE MFG. COMPANY, of Kansas City, Mo., has issued Catalogue No. 5, which contains a complete list of telephones and accessories, construction material, tools, etc. Among the telephones listed are seven different types of magneto instruments to meet any and all classes of service. Switchboards for toll and subscribers' lines, as well as for farmer or rural lines, are listed and can be furnished to meet all requirements. Among the accessories are linemen's testing sets, generators, ringers, extension bells, transmitters, receivers, pay station coin collectors; wire, iron, copper, twisted, insulated; cables, connectors, terminals, distributing frames, cleats, expansion bolts, lightning arresters, tape, solder, testing instruments, pole changers, tools, linemen's accessories, torches, reels, construction tools, and material of every description. The catalogue also contains a short treatise on line construction which will be of interest to the readers. This company is in an exceptional position to make prompt and quick shipments and earnestly desires to hear from all parties interested.

THE CONN. TEL. & ELEC. CO., INC., of Meriden, Conn., has filled a long-felt want for over-loaded country lines in its new non-interfering ringing device. This device is especially designed for stopping the listening upon a heavily loaded bridging line. It makes no difference how many receivers are off the hook, you can

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FREE TO YOU—Send Postal For It

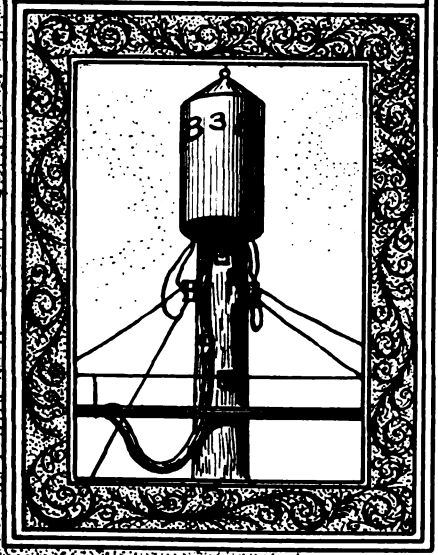
This is the cover page of a booklet illustrating and describing some of the work I am doing. The remaining pages will appear in this space from week to week. The booklet itself, printed in two colors on heavy plate paper, will be sent free to anyone interested.

The Dawn of a New Era in the Telephone World

LeRoy W. Stanton
CONSULTING AND CONSTRUCTING TELEPHONE ENGINEER

ELECTRIC B'LD'G
CLEVELAND,
OHIO

1644 MONADNOCK B'LD'G.
CHICAGO,
ILLINOIS



The Open Wireless or All-Cable Plant Reduces Depreciation and Maintenance 50 Per Cent.

by means of the Multiple Tap Cable System, properly selected equipment and to a certain extent, selective party lines and Measured Service.

The Net Earnings of Telephone Properties Can be Increased More than 100 Per Cent.

That is, the net earnings can be made double what they are in old style telephony. **This is not idle talk, but truths which are actually being demonstrated.**

"Money Saved is Money Earned"

I have saved others money; given the opportunity, I can do the same for you. — LEROY W. STANTON.

ELECTRIC BUILDING, CLEVELAND, OHIO.

MONADNOCK BUILDING, CHICAGO, ILL.

Please Mention the AMERICAN TELEPHONE JOURNAL when writing to ADVERTISERS.

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IN THE MANUFACTURING FIELD

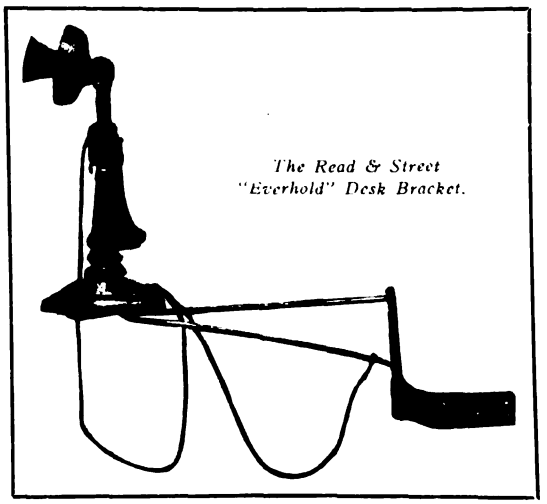
"SUCCESS LIES IN THE KNOWLEDGE OF OUR TOOLS"

ring through them all. The company will furnish particulars of this system upon request.

SWITCHBOARD LAMPS.

THE Howard Miniature Lamp Company, 221-227 Canal street, New York, and 183 Lake street, Chicago, is placing upon the market a wide variety of telephone lamps which are so designed as to fit any of the jacks or sockets commonly found upon the switchboards of well-known manufacturers. In a new catalogue which this company is distributing, these lamps are described and illustrated in a thorough manner, but on account of the diversity of the different types it is impossible to detail all the different ones, and therefore those interested should write, giving full particulars of their requirements.

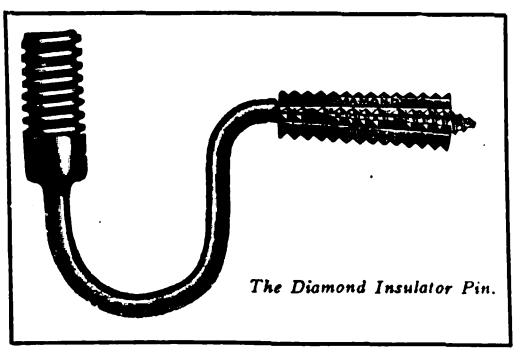
Switchboard lamps require so much care in their design that it is absolutely necessary that all the details incident to their ultimate use are necessary to secure the best results. This firm is in an exceptional position to furnish any and all styles, and will be pleased to confer with all interested. The catalogue lists lamps varying from .2 to .5 candle-power, with working voltages from 4 to 40, and current consumption from .05 to .36 amperes. Special designs for voltages up to 60 will be quoted upon request, and any other information will be cheerfully furnished by the company.



The Read & Street "Everhold" Desk Bracket.

A NEW DESK BRACKET.

FOR quite some time it was realized by exchange managers that the cost of maintenance upon desk telephones was way out of proportion when compared with that necessary for wall instruments. The reason was obvious, a desk telephone could be easily upset, and severely damaged by clumsy handling. The partial solution to this vexatious and expensive problem came with the introduction of desk brackets. Soon there were several types upon the market, each having good points, but it remained for the firm of Read & Street, 48 N. 11th street, Philadelphia, to reach the acme of simplicity and neatness in design in their "Everhold" telephone rest. Its commendable features are many, its faults may be put down as a minus quantity. From the accompanying illustration a good general idea can be obtained of the device. It will be noted that there are no screws or other clumsy attachments necessary to fasten the telephone to the holder, the spring formation of the clamp being so arranged as to enable a desk instrument to be put in place without the use of any tools whatever. It is the lightest and most substantial desk bracket on the market, and having no wearing parts to get out of adjustment, it offers the most economical type of bracket so far devised. The holder is heavily nickeled and presents a graceful appearance. Another special feature is that on account of its spring character it does not convey vibrations to the transmitter as readily as the solid arms, and its use is therefore very advantageous in mills or other buildings subject to vibrations. The firm will be pleased to furnish full particulars and prices upon request.



The Diamond Insulator Pin.

THE NATIONAL CARBON COMPANY, Cleveland, Ohio, was awarded the "Grand Prize" for batteries at the Louisiana Purchase Exposition. It manufactures the Columbia dry cell and therefore it is the first and only "Grand Prize" dry cell in existence. This company has experienced an extraordinary sale for its Columbia cell, and claims that telephone companies are using more of this type of battery than all other makes combined. Further information about all classes of batteries will be gladly furnished upon request.

DIAMOND INSULATOR PIN.

THE New Jersey Foundry & Machine Co., of 9 Murray street, New York, has recently placed on the market an insulator pin, shown by accompanying engraving, which will be of interest to telephone, telegraph, electric light and power, signal companies, and others having occasion to fasten insulators to brick, stone, concrete, or other masonry.

The pin itself is of cast iron, with threads to fit standard glass and porcelain insulators, a bolt being cast in the base and made with a lag screw thread to fit the Diamond Expansion Shield, which will secure a positive hold in any solid material, making a simple, strong and economical fastening. The bolt can also be furnished for use with regular oak or locust pins.

The shank of the bolt can be furnished straight, with a Spanish hook, or any angle desired.

A large number of these insulator pins are being used in the subways of the Interborough Rapid Transit Company, of New York, for carrying wires under station platforms.

The pins are manufactured by the New Jersey Foundry & Machine Co., of 9 Murray street, New York, who will furnish any further information to parties interested upon request.

THE MODEL ELECTRIC COMPANY, 204 North Main street, Burlington, Iowa, has a very attractive proposition in apparatus to offer to telephone companies. This firm is engaged in the manufacture of a type of telephone material that bids fair to quickly place it on a plane with the largest and oldest manufacturers in the country. Telephones and accessories for all classes and conditions of use are offered at a price which heretofore has been considered incompatible with good workmanship, yet so much time and thought has been put into the design of the various parts that increased economy in manufacture is attained, and thus the instruments can be sold at the prices quoted. Every part is designed for the maximum of efficiency by expert mechanics, and before shipping is submitted to the most critical tests to discover any possible defects. A sample instrument will be sent prepaid on approval by the company. This offer in itself proves the quality of its apparatus, because it is certain to be submitted to severe tests.

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A Baird Pay-Station
ON TRIAL

has proven to be our **best salesman**. It puts up an argument all its own which has seldom failed to convince the most skeptical that installing pay-stations means profits especiallyif they are

Baird Pay-Stations

Write us about them. Our catalogue and net price list mailed on request.

Baird Manufacturing Company
4 Michigan St., Chicago, Ill.

The question of quality in Telephones is satisfactorily answered in

"Model Telephones"

Our instruments are the best long experience, skilled workmen, and complete equipment can produce.
Our price is the only cheap thing we offer. Let us tell you about the best telephones for rural lines and exchanges.

Write for prices

A Sample Telephone Will be Sent You Charges Prepaid

If your Switchboard, Telephones or lines are out of order, let us submit our prices on repairing them.

MODEL ELECTRIC CO.

Telephone Manufacturers. Electric Supplies.

Prompt Shipments. No Charge for Packing.

204 North Main St., Burlington, Iowa, U. S. A.

Happy Returns

"Style A."
(Exact Size.)

For Twin or Parallel Wires.
Price $4.50 per 1000.

are in order at this time of the year. If you are looking for "happy returns" in the shape of ***dividends*** from your telephone investment, the many merits of

The Morris Hard Fibre Cleats

are worth your careful attention.

They Eliminate Depreciation.

Style "B."
(Exact Size.)

For Twisted Pairs.
Price $4.50 per 1000.

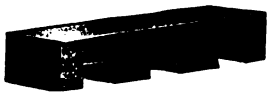
First Cost no more than other cleats. Can be installed in one-half the length of time required by other methods of inside wiring.
When once installed they last forever.
Never break or split, or come off.

Style "C."
(Exact Size.)

For Corners.
Price $4.00 per 1000.

Are smaller and neater than all others.
That's why they bring "Happy Returns."

"Style D."
(Exact Size.)



For Three Wires.
Price $6.50 per 1000.

Write To-day for Free Samples.

Morris Electric Co.,

Manufacturers of Fibre for Electrical Purposes

4th and Shipley Streets, Wilmington, Del.

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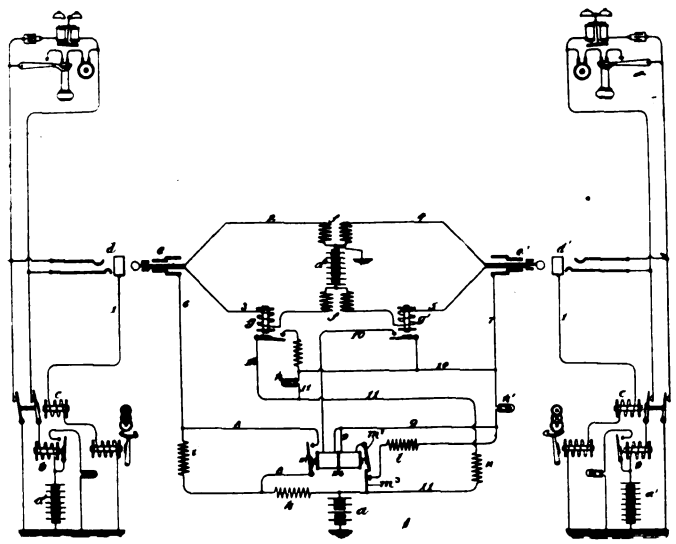
TELEPHONE PATENTS

TELEPHONE SERVICE METER.

F. R. McBerty, Evanston, Ill., patents (No. 777,217) an improved form of service meter, and assigns to the Western Electric Company.

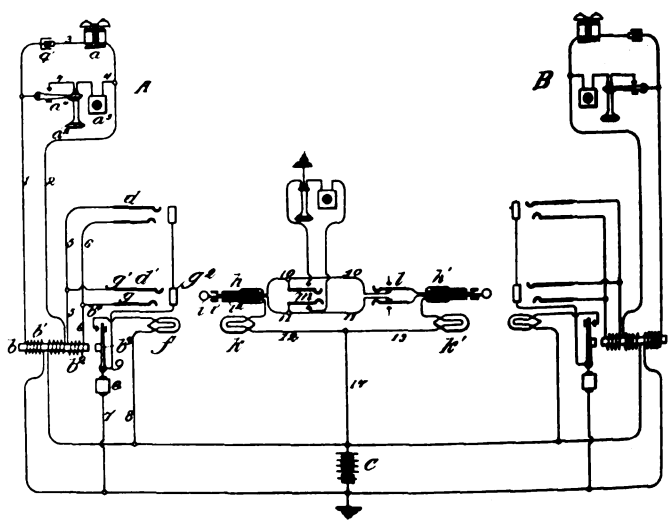
This patent is a further development of Re-issued Patent No. 12185. Circuit is shown in the accompanying illustration. So far as the subscriber's line is concerned it is arranged in the usual manner, excepting that additional magnet and service meter is added to conductor *1* extending through the cut off relay *C*. The cord circuit has the position of the supervisory lamp h_1 changed, and four resistances, *i*, *k*, *l* and *n*, operate in conjunction with



the relay *m*. The operation is as follows: When the operator answers, the local circuit *6 1* is completed. The shunt *8* about coil *i* being open, the current in circuit *6 1*, while sufficient to excite the cut-off relay *c* of the calling line, is inadequate to move the armature of the service meter. Likewise current through *7 11* and conductor *1* of called line is sufficient to excite the cut-off relay; but by reason of the resistance coils and of the high resistance of the signal lamps it is insufficient to operate the service meter of the called line. The current tends to excite the lamps *h* and h^1. Simultaneously with the closure of the local circuit in the answering plug and spring jack of the calling line current is permitted to flow in the line from the source a^2, which excites the supervisory relay and shunts the lamp *h*. Hence lamp remains dark. But the lamp h^1 is lighted. When the telephone at the called station is taken for use, the relay *g* closes the shunt circuit *10* of lamp h^4, excites relay *m* and causes it to close its armature m^1 and m^2 against their front contacts. The movement of lever m^2 breaks the direct path of current from the battery through the lamp h^1 and completes a new circuit through the other winding of magnet *m*, which thereafter maintains the excitement of the magnet independently of the shunt *10*, and subject only to the completion of the circuit *7 9 1* through the local contacts of the calling plug and the spring jack of the called line. The movement of the switch lever m^1 against its contact produces in the circuit *6 1*, through the answering plug and local conductor of the calling line, a current sufficient to operate the service meter of that line, which is thereby caused to register the completed connection. The service meter is then held in its attracted position until the circuit is broken. Both signal lamps *h* and h^1 meantime remain subject to the controlling shunts *12* and *10*, respectively, so that they indicate to the operator the condition of the telephone switches. The magnet of the service meter associated with the called line will not receive sufficient current for its actuation, by reason of the high resistance included in circuit therewith. It is customary for users of telephones to give a number of orders for connection with wanted lines in quick succession, and the operation of making the required connections is greatly facilitated by leaving the answering plug in the spring jack of the calling line, removing the calling plug only from the spring jack of the called line upon the flashing of the calling subscriber's signal lamp *h* and inserting said plug in the spring jack of another wanted line.

COMMON BATTERY SWITCHBOARD CIRCUIT.

C. E. Scribner, of Chicago, Ill., patents (No. 772,833) an improved common battery switchboard circuit and assigns to the Western Electric Company. In common battery switchboards it is common to insert repeating coils in the plug circuits. This arrangement is open to the objection that the signal relays are shunted by the repeating coil and sometimes rendered inoperative. The object of the present circuit is to improve in this respect. The substations are represented by *A* and *B*, connected with the central office by conductors *1* and *2* that extend through the winding *b'* of the repeating coil *b* and thence to the battery *c*. This repeating coil *b* contains another winding *b2* which extends to the springs of the jacks by the conductors *5* and *6*. The core of the repeating coil is provided with an armature *b3*. When the coil is excited this armature closes the contacts *b4* and illuminates the line lamp *f*, the circuit being from the battery *c* through conductor *8*, lamp *f*, armature of relay resistance coil *e*, conductor *7* to battery. When the operator inserts the plug *h*, a new arrangement of local circuits is formed, there being a



path from the battery through wires *14* and *12* to sleeve *i2* of the plug, thence to the ring of the jack *g2* through wires *7* and *9* to the battery *c*, then the supervisory lamp *k* is in parallel with the line lamp *f* and both in series with the resistance *c*. The lamps and the resistance are so proportioned that under these circumstances the lamps do not light. As soon as the receiver is returned to the hook, the relay *d* is demagnetized, its armature falls back and the supervisory lamp *k* is illumined because the shunt due to the line lamp *f* is removed.

IMPROVED TELEPHONE SYSTEM.

Charles Adams-Randall, Boston, Mass., patents (No. 777,324) an improved telephone system. In this invention the inventor proposes to improve telephonic transmission by arranging condensers of sufficient capacity at the ends of the telephone line so that it is unnecessary to employ either a ground return or a metallic conductor to complete the circuit.

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GEORGIA YELLOW PINE CROSS ARMS
LOCUST PINS J. S. BOGGS :: :: ALBANY GA.

MY CLAIMS: QUALITY, QUANTITY QUICK SHIPMENTS.
WRITE ME FOR ANYTHING YOU WANT IN THIS LINE.

N. G. PINE CROSS ARMS
Locust and Oak Insulator Pins,
Oak Brackets, Pole Steps
Prompt Shipments. Write for Prices
The W. M. ABSHER CO.
North Wilkesboro, N. C.

CHESTNUT POLES
We wish to advise our old patrons and prospective ones, too, that we have again stocked up on poles, and have a fine lot of heavy long poles as well as fair stocks of short ones.
THE MEDORA MILLING CO., Medora, Ind

We Make a Specialty of Telephone Poles.
POLES
Large Stock 35 to 75 ft. 4 to 6 in. Tops For Rural Lines
YARDS:
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Pendleton & Gilkey
816 Lumber Exchange,
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POLE PRODUCERS.
We are producers and save you the jobbers' profit. That's why our prices are lowest. A trial order will convince you. Also that our ***White Cedar Poles*** are the finest in the land. Write for prices F. O. B. your town.

BRACKETS--X ARMS--PINS
Little things it is true, but they cut a big figure in line construction.
OUR MOTTO IS:
Prompt Shipment—Quality Satisfaction—Right Price
COLUMBIA MFG. CO. ANTIGO, WIS.

Tell the Advertiser you saw his announcement in
The American Telephone Journal.

AN AMERICAN JOURNAL For AMERICAN INDEPENDENT TELEPHONE MEN
Read from Atlantic to Pacific; Canada to Mexico; and overflows into all other countries.

Back Braces and Shims
We Galvanize by Hot Process.
Manufactured by
M. LANZ & SONS,
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W. C. STERLING & SON
MONROE, MICH.
Telephone Poles
Wholesale Producers 20 Years Eleven Pole Yards

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Land of Sunshine, Fruit and Flowers
IF you can spare the time this fall or winter there is no reason why you should not enjoy the charm of California's balmy air and invigorating sunshine, the delicious fruits and lovely flowers, the big trees, the old missions and the glorious Pacific. Think it over—Can you afford to miss the California trip?
Burlington Route
Ask us as many questions about the trip and about California as you like—they will be answered correctly, promptly, courteously.
J. FRANCIS, Gen'l Pass'r Agt. Chicago.
P34

We Rush Orders...
COHN & BOCK
YELLOW PINE CROSS ARMS
Oak Insulator Pins and Brackets

PRINCESS ANNE - - - MARYLAND

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THE WEEK'S MESSAGES

FINANCIAL.

CEDARVILLE, ILL.—The capital stock of the Cedarville Telephone Co. has been increased from $15,000 to $40,000.

OSSIAN, IND.—The Uniondale Rural Telephone Co. of Ossian has increased its capital stock from $1,300 to $13,000.

REPUBLIC CITY, KAS.—The Republic City Telephone Co. stockholders voted for a loan not exceeding $2,000 to be used in building new lines.

CENTRALIA, MO.—The Central Telephone Co. has increased its capital stock from $6,000 to $30,000.

CEDARVILLE, O.—The Cedarville Telephone Co., of Cedarville, has recently increased its capital stock from $15,000 to $40,000.

CHESTER HILL, O.—The People's Telephone Co., of Chester Hill, has increased its capital from $5,000 to $15,000.

FRANCHISES.

FULLERTON, CAL.—Application has been made to the Board of Trustees of the City of Fullerton for a franchise for a period of fifty years to erect, maintain and operate a telephone system.

WEST PALM BEACH, FLA.—J. R. Anthony, Jr., and others have applied for a franchise to operate a telephone system at Palm Beach.

MOULTOH, IA.—The Farmers' Mutual Telephone Co. has been granted a franchise.

HOBART, OKLA.—The Washita Valley Telephone Co. has been granted a franchise at Hobart.

ROCHESTER, MINN.—The Tri-State Telephone Co. has been granted a twenty-year franchise.

SEATTLE, WASH.—The Independent Telephone Co. has applied for a franchise, which was granted to them last Thursday, covering every road in the country.

ELECTIONS.

BLOOMINGTON, ILL.—At a recent meeting of the McLean County Telephone Co. the following officers were elected: President, F. Y. Hamilton; vice-president, William H. Johnson; secretary, Henry Thobro; treasurer, George Purr.

CRAWFORDSVILLE, IND.—The Co-Operative Telephone Co. at its annual meeting elected the following directors: David Remley, George Wasson, Clarence Williams, Perry Stump, and John Sewers.

BOONE, IA.—At the annual meeting of the Dodge-Harrison Telephone Co. the officers for the coming year were elected as follows: President, Fred Hein; secretary, Maurice Garvey; treasurer, Adam Moeller.

KALONA, IA.—At a recent meeting of the Kalona Mutual Telephone Co. the following officers were elected: William Rawson, president; John Durst, treasurer; U. C. Smith, secretary; Dr. Kison, W. G. Brooke, Dr. Allen and Harry McNulty, directors.

LEMARS, IA.—At the annual meeting of the LeMars Telephone Co. the following officers were elected: A. C. Colledge, president; I. S. Mahin, treasurer and secretary.

BUXTON, N. D.—The Red River Valley Telephone Co. recently held their annual meeting, and elected the following officers: President, T. J. Smith; vice-president, P. M. Paulson, secretary, treasurer and general manager, F. H. Hagen.

ST. ALBANS, VT.—At a recent meeting of the Franklin County Telephone Co., the following officers were elected: President, Jasper N. Keller, Boston, Mass.; vice-president, J. H. Abbott, of Gouverneur, N. Y.; treasurer, E. S. Willard, of Boston, Mass.; secretary, S. W. Flinn, of St. Albans; auditor, E. W. Longley, of Boston, Mass.

COMBINATIONS.

FT. WAYNE, IND.—The Leavenworth Telephone Exchange has been purchased by George W. Beers, of this city. It is Mr. Beers' intention to reorganize the exchange and make it thoroughly modern. He will spend $150,000 in improvements.

MINNEAPOLIS, MINN.—A syndicate of Minneapolis men, with S. S. Thorpe at the head, has purchased the Mississippi Valley Telephone Company's property in Iowa for $400,000. The property includes extensive exchanges at Muscatine, Burlington, Keokuk, Madison and Wappello, and were formerly operated by J. C. Hubbinger. The name of the company will remain the same, S. S. Thorpe to be president, and Thomas Peebles, secretary and general manager.

OLEAN, N. Y.—A. V. Hurd, of Olean, has purchased the Home Telephone Co., of Port Allegheny, Pa.

EGAN, S. D.—Mr. G. W. Moit, owner of the Egan Telephone, has bought the Flandreau system, and is planning to make one line of the two rural lines.

PENDLETONVILLE, TEX.—Mr. J. V. Moore and son have bought out the Pendleton Telephone Co., and will shortly put up lines along the various public roads.

NEW COMPANY NOTES.

WASHINGTON, D. C.—The Telegraph & Telephone Auxiliaries Co., of Washington, has been incorporated with a capital of $300,000 by F. R. Austin and others.

ALEXIS, ILL.—The Alexis Telephone Co., of Alexis, has been incorporated with a capital stock of $5,000.

CHICAGO, ILL.—The Western Telegraphone & Telegraphex Co., Chicago, Ill., has been incorporated with a capital stock of $60,000. The incorporators are R. P. Jack, Herbert W. Danforth and W. I. Irwin.

FISHER, ILL.—The Grangers Mutual Telephone Co. has been incorporated, and has recently increased its capital stock from $15,000 to $20,000.

GRAYVILLE, ILL.—The Westfall Telephone Co., Grayville, Ill., has been incorporated with a capital stock of $4,000 by W. F. Westfall, Claude O. Ellis and Nathan March.

TEMPLE HILL, ILL.—The Egyptian Telephone Co., of Temple Hill, has been incorporated with a capital stock of $2,500.

AMBOY, IND.—The Amboy Telephone Co., of Amboy, has been incorporated with a capital stock of $20,000 by N. W. King and others.

ELKHART, IND.—The Automatic Switchboard & Telephone Mfg. Co. has been incorporated with a capital stock of $10,000.

LIBERTY, IND.—The Liberty Telephone Co., of Liberty, has been incorporated with a capital stock of $20,000.

MADISON, IND.—The Standard Bracket & Pin Co. has filed articles of incorporation with the Secretary of State. The capital stock is $12,000. The company will establish a plant to manufacture arms, brackets, pins and other wares used by telephone and telegraph companies. A. L. Schmidlap, George W. Cofield and B. F. Head, incorporators.

CLARE, IA.—The Clare Mutual Telephone Co., of Clare, Ia., has been incorporated with a capital stock of $10,000. Incorporators: Charles Donahue and others.

ANDOVER, KAS.—The Windom Rural Telephone Co. was organized at Andover recently. The following officers were elected: B. F. Bengston, president; John Zimmerman, vice-president; A. E. Duvall, secretary; and Benn Kidd, treasurer.

OSAGE CITY, KAS.—A local telephone company has been organized with the following officers: President, William Sanders; secretary, Luther Anderson; treasurer, O. H. Johnston.

PORTLAND, KAS.—The Farmers' Mutual Telephone Co., of Portland, Kas., has been organized to build rural lines.

FREDERICKSBURG, KY.—The Fredericksburg & Ramsey Telephone Co. has recently been incorporated, with the following officers: F. L. Craydon, president, Edward McKinster, secretary; G. R. Durnill, treasurer.

PORTLAND, ME.—The International Microphone Co. has been organized at Kittery for the purpose of conducting a general business in telephones, microphones, etc.

OKEMOS, MICH.—The Mason & Okemos Telephone Co. has been incorporated with a capital stock of $2,000.

UNADILLA, MICH.—The Unadilla Telephone Co. has been incorporated with a capital stock of $9,975.

CAMBRIDGE, MINN.—The Cambridge Telephone Co., of Isanti County, has been incorporated with a capital stock of $50,000. Incorporators are Godfrey G. Goodwin, A. C. Bowe, G. K. Carlson and R. B. Hixon.

PRINCETON, MO.—The People's Mutual Service Co., of Princeton, has been incorporated with a capital stock of $100,000. Incorporators: William E. Paschen, J. C. Granger and F. J. Newell.

CHESTER HILL, O.—The Chester Hill-Elliott Telephone Co., of Chester Hill, has been incorporated with a capital stock of $3,000 by Hiram Hart, Arthur Patterson, W. A. Thomas and others.

VAN WERT, O.—The Farm City Telephone Co., of Van Wert, has been incorporated with a capital stock of $20,000 by F. W. Purmort, J. A. Wilmore and others.

ANADARKO, OKLA.—The business men of Apache, together with a large number of farmers between Apache and Anadarko have organized a stock company to build a telephone line from Apache to Anadarko. President, O. W. Rogers; secretary, Arthur Dyer; treasurer, N. Hester.

PLEASANT HILL, ORE.—The Pleasant Hill Telephone Co. has been incorporated at Pleasant Hill with the following officers: President, W. L. Wheeler, vice-president, William Ellis, secretary, H. H. Ruth, treasurer, F. E. Parker.

CHEROKEE, OKLA.—The Cherokee Rural Telephone Co., of Cherokee, has been incorporated with a capital stock of $12,000. Incorporators: C. Bradley, G. H. Coulson, A. D. Small, J. W. Soward, and C. Slemmons, of Cherokee.

MARION, S. D.—The Marion Telephone Co. has been incorporated with a capital stock of $10,000.

WILLS POINT, TEX.—The Farmers Telephone Co. has been incorporated with a capital stock of $10,000 by I. F. Calee, J. E. Owens and others.

GRANTSVILLE, VA.—Corporation papers have been granted to the Little Kanawha Telephone Co., of Grantsville.

KILBOURNE, WIS.—The Farmers Intercounty Mutual Telephone Co., of Kilbourne, has been incorporated with a capital stock of $5,000 by D. A. Lanett, H. B. Metcalf, Charles W. Neff, and Benjamin Olson.

UNDERGROUND.

BESSEMER, ALA.—The People's Home Telephone Co. is making a number of extensions and improvements, including the erection of a large conduit containing 200 pairs of wires.

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ANOTHER WARNING

Times' about up for the easy setting of poles. Ground will freeze pretty hard in a few days.

Better order those Poles where you will be sure of Prompt Shipment.

MALTBY CEDAR COMPANY, 512 Phoenix Block, Bay City, Mich.
Pittsburgh Agents, TIPPER & PATTON, 512 Empire Building.

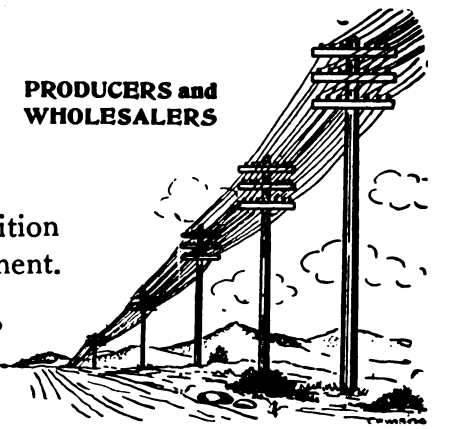
SIGN YOUR NAME HERE FOR PRICES.

PITTSBURG & LAKE SUPERIOR IRON CO.,
ESCANABA, MICHIGAN.

PRODUCERS and WHOLESALERS

WE always carry a large stock of all sizes of White Cedar Poles, and having yards on all principal railroads in Northern Michigan and Minnesota, are in position to make immediate shipment.

"From the Stump to the Line."



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FOR EIGHT YEARS

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Fitted with an eider-down pad, and double spring head band: very powerful, durable and is adapted for long, heavily loaded lines.

Send for catalogue.

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Mfrs. and Importers of Switchboards, Telephones, and Telephone Supplies.

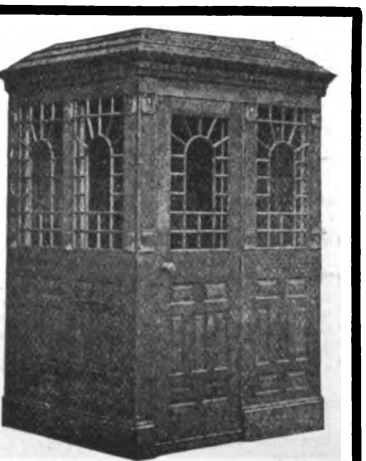
298 Broadway, New York City.

There's a difficulty in hearing over the best telephones when they are located in noisy neighborhoods.

Sound-Proof Booths

make hearing easy over the worst telephone, even if it's in a boiler works. We are Booth Specialists, and would like to hear from you. May we not send our catalogue.

YESBERA MANUFACTURING CO., Toledo, Ohio



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BELLAIRE, O.—Good progress is being made in the installation of the underground system of the Ohio Valley Telephone lines. The work has to be done rapidly to prevent the cement freezing.

PERSONAL.

NICHOLAS ARROWSMITH has been appointed district manager of the Morristown, N. J., telephone office of the New York & New Jersey Telephone Co.

J. E. HENDERSON has been appointed division superintendent for the Southwestern Telegraph & Telephone Co. at Fort Worth.

OBITUARY

JOHN C. JOHNSON, secretary of the Delaware & Madison Counties Telephone Co., died suddenly of apoplexy at his home at Muncie, Ind., at the age of sixty-one.

MISCELLANEOUS.

OTTAWA, ILL.—The Bureau County Independent Telephone Co. now has 3,200 telephones in use in Bureau county and the number is still growing.

BEDFORD, IND.—The Home Telephone Company's exchange was recently damaged by fire.

OTTUMWA, IA.—The Hudson Mutual Telephone Co. is negotiating for the lease of a United States circuit from here to Hudson.

WEBSTER CITY, IA.—A recent fire in this town did considerable damage to the Hamilton County Telephone Co.

MAYSVILLE, KY.—George Shaw, of Carlisle, representing an Ohio syndicate, is in this city to perfect an organization with the telephone companies whereby a full metallic service will be put in between this city and Louisville, going by way of Carlisle and Lexington. This will give Maysville communication with the Central Kentucky towns and will give Louisville an outlet to the north by way of this city and Portsmouth, O.

OWINGSVILLE, KY.—A company has been organized to build a telephone line from Moore's Ferry to Salt Lick, this county, a distance of five miles.

LEWISTON, ME.—The Lewiston & Auburn Telephone Co. has issued its first directory of subscribers to the new automatic system in Lewiston.

ALMA, MICH.—The Union Telephone Co. has had a great business during the past year throughout its territory. During the twelve months ending November 1st, they had installed 1,200 new telephones. A great many of these new subscribers are on rural lines, although in each of the towns where they have an exchange the number of subscribers have increased. At Alma the company has doubled in the past eighteen months.

FREMONT, NEB.—A meeting of farmers in this vicinity was recently held to make arrangements for the extension of the Fremont Telephone Company's lines into the rural districts.

FREDERICK, N. B.—At the semi-annual meeting of the New Brunswick Telephone Co., Hon. Mr. Thompson said the cost of repairing the wires after the late storm would cost about $10,000 or $15,000.

PORTAL, N. D.—The Clyde Telephone Company has commenced business here.

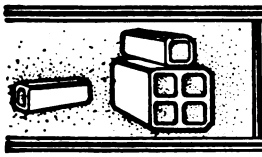
LOWER NEWPORT, O.—Surveyors for the Marietta Telephone Co. are surveying the proposed new line through here to Newport.

SALEM, O.—The Salem Township Rural Telephone Co. has its lines nearly completed, and within a few days the subscribers will be connected up with the switchboard of the Columbiana county exchange at Leetonia. The Salem township company has made arrangements with the Columbiana county lines for interchange service.

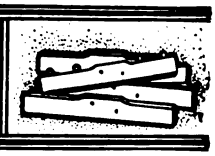
CALIFORNIA, PA.—The Union Telephone now gives service to 250 subscribers in California, Coal Center, Twilight and the surrounding country.

COGAN HOUSE, PA.—A number of citizens interested in the telephone line held a meeting to determine the terminus of the line and the section through which it would be installed.

NEWCASTLE, PA.—The Pennsylvania & Mahoning Valley Telephone Co. is to have an Independent telephone system connecting all points on the line.



New Construction in the Field



BESSEMER, ALA.—The People's Home Telephone Co. has completed a telephone line from Bessemer to Hawkins Springs, and will begin work on a line to East Bessemer. A 200-pair cable is being erected in the city to give the north side of the city a better service.

VENTURA, CAL.—The Home Telephone Co. has practically completed its outside work in Ventura. Over 100 miles of copper wires have been used in wiring the town.

ROCK ISLAND, ILL.—A telephone line is being built between Taylor Ridge and Edgington to connect with the local exchange of the Union Electric Telephone Co. at Edgington.

CEDAR FALLS, IA.—The United States Telephone Co. has installed a new switchboard in this village.

CENTERVILLE, IA.—The Mutual Telephone Co. is considering improvements and extension of its plant.

ESTHERVILLE, IA.—The Emmet County Telephone Company is contemplating extensive improvements.

INDUSTRY, KAN.—The Farmer's Telephone Company has begun the construction of a line from Buckeye to Upland.

SAVONBURG, KAN.—The Savonburg-Leanna Telephone Company will install a modern switchboard in local exchange.

SOUTH HAVEN, KAN.—R. W. Kemp, contracting engineer of Wichita, Kansas, has just completed an exchange for the Farmers' Mutual Telephone Company at South Haven, and has secured the contracts to build the mutual lines for the Chickaskia Mutual Telephone Company from Milan to Wellington, via Mayfield, and the Oxford Mutual Telephone Company from Oxford to Wellington, via Dalton. The lines when complete will connect with the Farmers' Mutual Company at Wellington and make a mutual system of over 2,000 subscribers.

STAFFORD, KAN.—The Larabee Bros.' Telephone Co., of Stafford, are preparing to install a new, up to date central energy system in the town of Stafford. Work has already been commenced and the new system will be in working order early in the new year. The best material obtainable will be used and the plant will be first class in every respect. The Stafford company will build a toll line west as far as Seward, where they will connect with the Larned Telephone Company's lines from Larned.

WELLINGTON, KAN.—The Anson Mutual Telephone Co. will build a rural line to this place and connect with the South Haven Mutual.

OWENSBORO, KY.—The Home Telephone Company has commenced work on the construction of an exchange at Ensor. This was necessitated by the increased business.

ECHO, MINN.—The Cokato Telephone Company is erecting a new country line which will be in use this winter.

HARDWICK, MINN.—A large addition is being built to the Enterprise telephone line west from here, and will run to Sherman, S. D.

MANKATO, MINN.—The Citizens' Telephone Company is building two additional lines in the Rapidan District.

KANSAS CITY, MO.—A meeting was held this week at the offices of the Home Telephone Co., of this city, to plan for other extensions of Independent toll lines in this part of the country, particularly to the East and Southeast. The following were in attendance: E. L. Barber, Wauson, O., president of the Western Independent Telephone Co.; Lee Benoist, of St. Louis, representing the Commonwealth Security Co.; J. J. Heim, O. C. Snider and Hugh C. Ward, of the Kansas City Home Telephone Co.

ADDISON, N. Y.—It is proposed to extend the Century telephone line to Addison.

BLOOMVILLE, N. Y.—Grant Mosier is constructing a telephone line from this village to Delhi. This line will be continued to Hobart and Oneonta.

KENMON, N. Y.—The Frontier Telephone Company is installing a local telephone exchange.

LONG BOLTON, OHIO.—The Citizens' Telephone Co. is making arrangements to string a wire across the river at this place to give Murrayville telephone connections.

NORTH CREEK, N. J.—The North Creek Telephone Company has extended its lines from that place to Johnsburg, Thurman and Stony Creek. A switch agreement has been made at Chestertown.

EASTON, PA.—The Slate Belt Telephone Co. is making rapid progress in rebuilding its lines.

S. BETHLEHEM, PA.—The Lehigh Valley Railroad Company has decided to equip its line with private telephone service for the exclusive use of officers of the company, located at many places along the big system.

TROY, PA.—The Citizens' Mutual Telephone and Telegrph Company is erecting a line from Tioga to connect at Painter Run with their line running from Mansfield to Elmira, which will give subscribers a service of four counties, Tioga, Bradford, Lycoming and Potter.

WELLSBORO, PA.—The Citizens' Mutual Telephone and Telegraph Company is erecting a line from Tioga to connect at Painter Run with their line running from Mansfield to Elmira. It will be finished in about 30 days.

SUMTER, S. C.—The Sumter Telephone Company has completed a new line to Summerton.

PIERRE, S. D.—The Capital City Telephone Company will install a new Monarch switchboard to take care of increased business.

ALICE, TEXAS.—J. S. Turner, manager of the Alice, Wade City and Corpus Christi Telephone Company, announces that he anticipates the improvement of the system.

WEST POINT, VA.—The Northern Neck Telegraph & Telephone Co. is improving its line, putting down new poles and extending its system.

EAU CLAIRE, WIS.—The Chippewa Telephone Company is building two new extensions to its system, which will greatly aid in its increased business in this city.

TELEPHONE TRAGEDY.

Act I.

Central—Hello! Number, please?

Man—Gimme 189.

(Ten minutes elapse between first and second acts.)

Act II.

Man—Say! Hello, central! (Rings again.)

Central—Hello! Number, please?

Man—Didn't I tell you I wanted 189?

(Five minutes elapse between second and third acts.)

Act III.

Central—Beg pardon. What number was it you wanted, please?

Man—Blankety! Blinkety! I want 189.

Central (sweetly)—They're busy.

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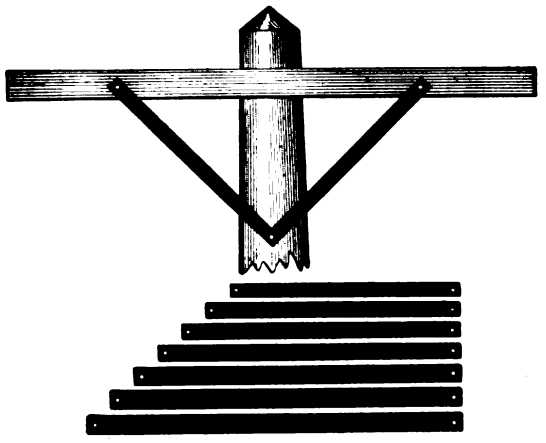

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CHICAGO, ILL.

Wholesalers of Michigan White Cedar **POLES** of QUALITY

Five Yards *Prompt Shipments*

A Happy New Year

and have you our prices on

CEDAR POLES

if not

Turn Over a New Leaf

and

Make a Good Resolution

not to be broken, to give us at least a sample order. We sell only ***GOOD POLES***—the bad ones go to our waste pile. Write and judge for yourself that our prices are low.

With Best of Wishes

Sand Point Cedar Co.

SAND POINT, IDAHO

CEDAR POLES

In All Sizes For All Purposes. Large Stocks. Prompt Shipments. Distributing yards at advantageous shipping points.

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TRIPARTITE STEEL POLE

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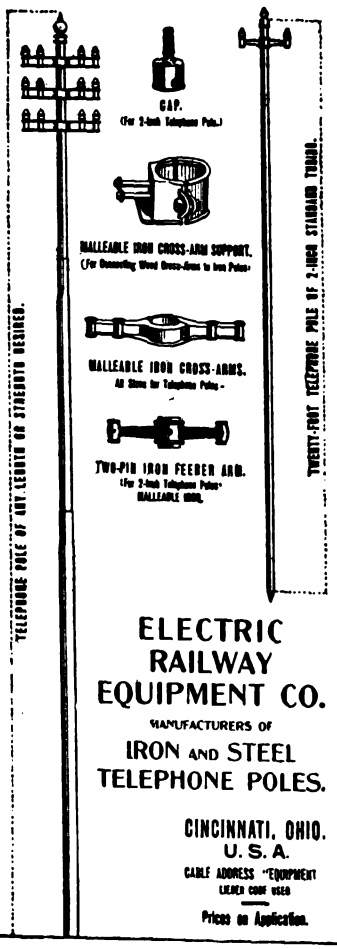

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Temporary Address, DES MOINES, IOWA.

BUTTERFIELD, J. F.
ELECTRICAL ENGINEER AND CONTRACTOR

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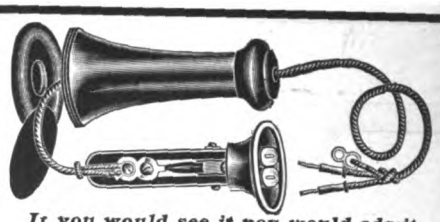

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Blanks, Books and Forms for Telephone Exchange and Toll Line Bookkeeping and Accounting

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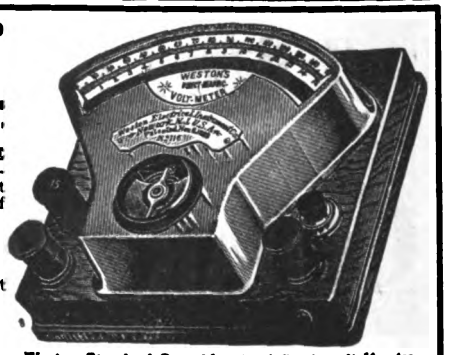

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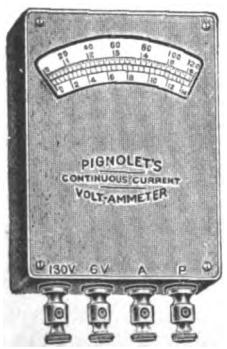

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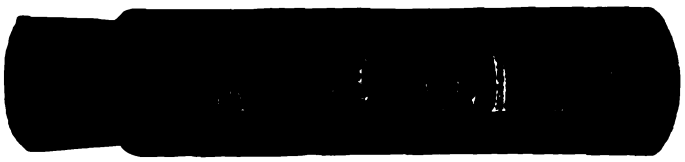

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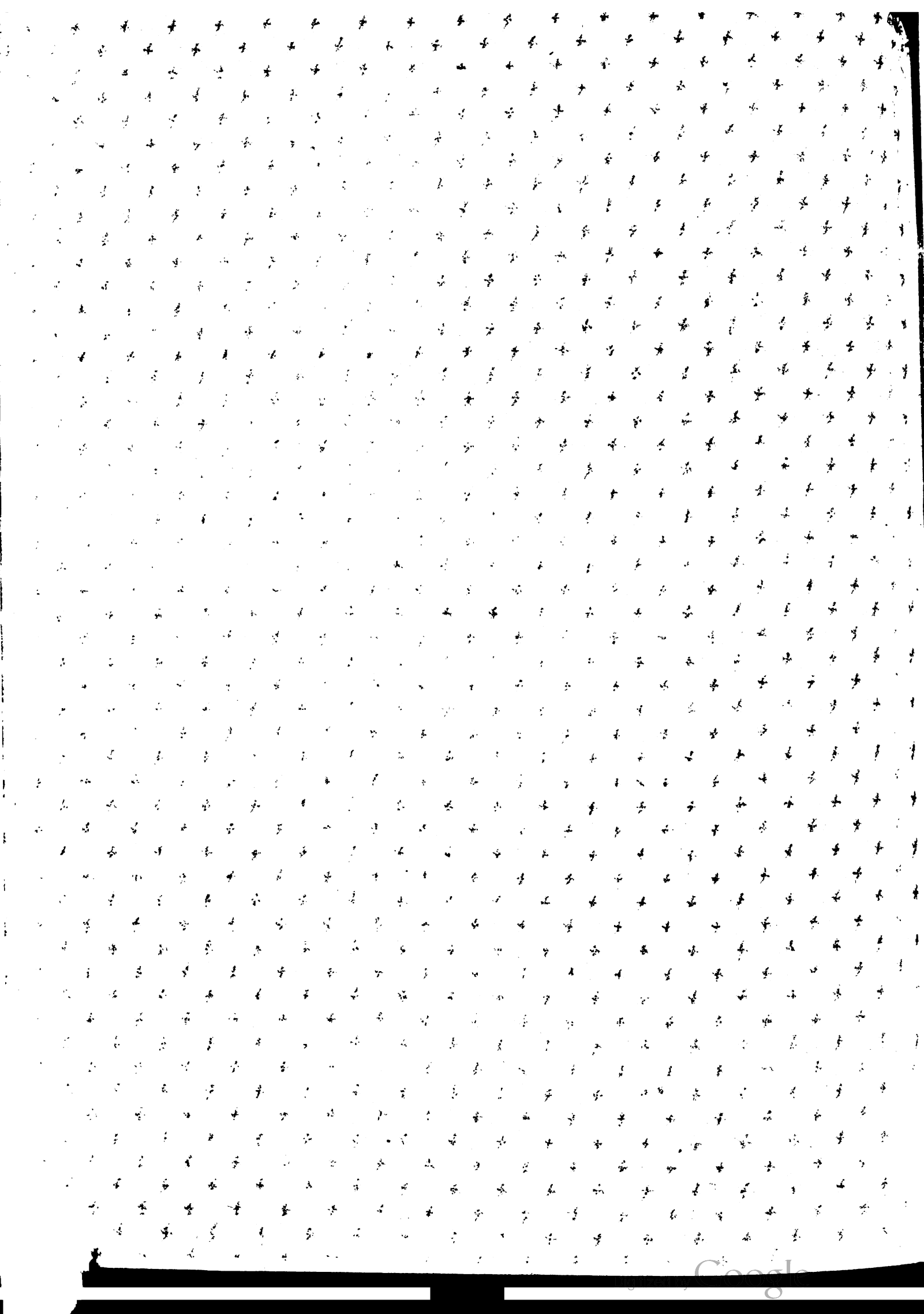

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